



ASTM F1642-04/GSA TS01 TEST REPORT

Rendered to:

3M COMPANY

PRODUCT TYPE: Fragment Retention Film on 1/4" Single Pane Glass and
1" Insulated Glass Units with Film Attachment System

SERIES/MODEL: 3M™ Safety Neutral S35 Safety and Security Window Film

SPECIFICATIONS: ASTM F 1642-04, *Standard Test Method for Glazing and
Glazing Systems Subject to Airblast Loading*
AND

GSA-TS01-2003, *US General Services Administration Standard Test Method for
Glazing and Window Systems Subject to Dynamic Overpressure Loadings*

This report contains in its entirety:

Cover Page: 1 page
Report Body: 13 pages
Test Facility: 1 page
Pressure Time Plots: 12 pages
Photographs: 14 pages
Drawings: 13 pages

Report No.: E1272.02-119-12
Test Completion Date: 12/19/14
Report Date: 02/27/15
Test Record Retention Date: 12/19/18



Summary of Results

Specimen No.	Film Type	Glass Type	Film Attachment Type	Average Peak Reflected Pressure	Average Positive Phase Impulse	Average Positive Phase Duration	GSA Performance Condition	ASTM F1642 Hazard Rating
1	Safety Neutral S35	1" IG Annealed	IPA ¹	5.36 psi	30 psi-msec	12.56 msec	No Hazard	2
2		1/4" Tempered	IPA ¹	4.49 psi	32 psi-msec	12.76 msec	No Hazard	2
3		1/4" Annealed	IPP ²	4.58 psi	32 psi-msec	10.46 msec	No Hazard	2
4			IPA ¹	6.83 psi	45 psi-msec	11.50 msec	High Hazard	5
5			IPA ¹	4.50 psi	32 psi-msec	12.79 msec	High Hazard	5
6			IPA ¹	4.74 psi	33 psi-msec	12.41 msec	Low Hazard	5

¹ IPA = 3M™ Impact Protection Adhesive

² IPP = 3M™ Impact Protection Profile

Reference must be made to Report No. E1272.02-119-12, dated 02/27/15 for complete test specimen description and detailed test results.



1.0 Report Issued To: 3M Renewable Energy Division
3M Center, Building 235, 3D-02
St. Paul, Minnesota 55144

2.0 Test Laboratory: Intertek-Architectural Testing, Inc. (ATI)
130 Derry Court
York, Pennsylvania 17406
717-764-7700

3.0 Project Summary:

3.1 Product Type: Fragment Retention Film on 1/4" Single Pane Glass and 1" Insulated Glass Units with Film Attachment System

3.2 Series/Model: 3M™ Safety Neutral S35 Safety and Security Window Film

3.3 Compliance Statement: Results obtained are tested values and were secured by using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimens tested. This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

3.4 Test Dates: 09/24/2014 - 12/19/2014

3.5 Test Facility: Intertek-ATI's shock tube is housed in a 10,000 square foot state-of-the-art test facility located in York, Pennsylvania. Blast loadings are produced on the specimen to simulate the effects of a high explosive charge at a specified standoff distance. Shock waves are generated by the sudden rupturing of a thin aluminum membrane. The shock wave expands as it travels down the tube, and impacts the target with a specific positive pressure and impulse. A photograph of the shock tube is provided in Figure #1 of Appendix A.

3.6 Test Sample Source: The test specimens were provided by the client. Representative samples of the test specimens will be retained by Intertek-ATI for a minimum of four years from the test completion date.

3.7 Drawing Reference: The test specimen drawings have been reviewed by Intertek-ATI and are representative of the test specimens reported herein. Test specimen construction was verified by Intertek-ATI per the drawings located in Appendix D. Any deviations are documented herein or on the drawings.

3.0 Project Summary: (Continued)

3.1 Data Acquisition: In accordance with ASTM F 1642-04 and GSA TS01, four reflective pressure transducers are utilized to record data at a 1MHz sample rate. Two reflective pressure transducers are located on the specimen holder at the top and right side (when viewed from the interior). A third pressure transducer is located on the shell to the exterior of the specimen, and a fourth is located in the witness chamber, directly to the interior of the specimen holder. A sketch of the specimen holder and corresponding reflective pressure sensor locations are provided in Figure #2 of Appendix A.

3.2 List of Official Observers:

<u>Name</u>	<u>Company</u>
Travis A Hoover	Intertek-ATI
Steven A. Neff	Intertek-ATI
Isaiah W. Gebhart	Intertek-ATI
Joseph A. Reed, P.E.	Intertek-ATI
Emily C. Riley	Intertek-ATI

4.0 Test Specifications:

ASTM F 1642-04, *Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading*

GSA-TS01-2003, *US General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings*

5.0 Test Specimen Description: The following descriptions apply to all specimens.

5.1 Product Sizes:

Measured Dimensions	Width (inches)	Height (inches)
Overall size	48	66
Fixed Day Lite Opening	43-1/4	61-1/4

5.0 Test Specimen Description: (Continued)

5.2 Frame Construction:

Test Specimen #1:

Frame Member	Material	Description
Head, sill and jambs	Aluminum	Extruded
Glass Stop	Aluminum	Extruded, snaps into place on sill frame member to secure the glazing

	Joinery Type	Detail
All corners	Square Cut	Butted and secured using extruded aluminum shear blocks
Jambs	N/A	The jambs were secured to each shear block at the sill end using four #10 x 2" long Phillips self-tapping pan head screws and were secured to each shear block at the head end using one #10 x 5/8" long Phillips flat head screw
Head	N/A	The head was secured to the shear blocks at each end using four #10 x 2" long Phillips self-tapping pan head screws
Sill	N/A	The sill was secured to the shear blocks at each end using one #10 x 5/8" Phillips flat head screw

5.0 Test Specimen Description: (Continued)

5.2 Frame Construction: (Continued)

Test Specimen #2 - #6:

Frame Member	Material	Description
Head, sill and jambs	Aluminum	Extruded
Pressure plate	Aluminum	Extruded, secured to head sill, and jambs using #1/4 x 1" long hex head self-tapping screws located 2" from each end and spaced 4" on center
Face cap	Aluminum	Extruded, snaps into place on pressure plate

	Joinery Type	Detail
All corners	Square Cut	Butted and secured using extruded aluminum shear blocks
Jambs	N/A	The jambs were secured to each shear block at the head and sill ends using two #1/4 x 1" long hex head screws
Head/Sill	N/A	The shear blocks were secured to the head and sill ends using two #10 x 1-1/4" long Phillips pan head screws.

5.0 Test Specimen Description: (Continued)

5.3 Glazing: All specimens utilized 1/4" thick clear glass with an 8 mil laminated safety and security film with metalized sun control film (3M Safety Neutral S35, 35% visible light transmission) adhered to the interior surface of the glass. The glass was secured in place using either a 3M™ Impact Protection Profile (IPP), flexible-mechanical rubber gasket type film attachment, or a continuous bead of 3M™ Impact Protection Adhesive (IPA) structural sealant.

Test Specimen #1 Glazing:

Glass Type	Interior Lite	Exterior Lite	Spacer Type	Glazing Bite
1" IG	1/4" annealed	1/4" annealed	Aluminum reinforced butyl	1/2"

Test Specimen #1 Glazing Method: The glass was exterior glazed against a kerf-mounted rubber gasket and secured with extruded aluminum pressure plate.

Test Specimens #2 - #6:

Test Specimen	Glass Type	Spacer Type	Glazing Bite
#2	1/4" tempered	Aluminum reinforced butyl	1/2"
#3 - #6	1/4" annealed		

Test Specimens #2 - #6 Glazing Method: The glass was channel glazed from the exterior against a kerf-mounted rubber gasket and secured at the sill using extruded aluminum glazing stops.

5.4 Hardware: No hardware was utilized.

5.5 Reinforcement:

Drawing Number	Location	Material
Tubelite 400 Series Curtain Wall Components, Detail PTB94	Head, sill and jambs (Test specimen #1 only)	1" wide by 3/4" deep aluminum "U" channel

6.0 Installation: The specimens were placed directly into the shock tube test frame.

7.0 Test Results: The results are tabulated as follows:

Test Specimen #1:

Description	Results
Ambient Temperature	65°F
Glazing Temperature	66°F
ASTM Hazard Rating	No Hazard
GSA Performance Condition	2

Peak Positive Pressure	
Top Pressure	5.16 psi
Right Pressure	6.17 psi
Shell Pressure	4.75 psi
Average Pressure	5.36 psi
Witness Chamber Pressure	1.04 psi

Peak Positive Phase Duration	
Top Duration	11.72 msec
Right Duration	0.15 msec ¹
Shell Duration	13.40 msec
Average Duration	12.56 msec

¹ Spurious data, not used to calculate average.

Peak Positive Phase Impulse	
Top Impulse	30 psi*msec
Right Impulse	30 psi*msec
Shell Impulse	31 psi*msec
Average Impulse	30 psi*msec

Glazing Response	
Exterior Lite	Shattered
Interior Lite	Fractured
Glazing Pullout Length and Location	None
Glazing Tearing	None

Witness Chamber Results	
No debris was observed.	

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

7.0 Test Results: (Continued)

Test Specimen #2:

Description	Results
Ambient Temperature	68°F
Glazing Temperature	67°F
ASTM Hazard Rating	No Hazard
GSA Performance Condition	2

Peak Positive Pressure	
Top Pressure	4.33 psi
Right Pressure	4.73 psi
Shell Pressure	4.42 psi
Average Pressure	4.49 psi
Witness Chamber Pressure	0.21 psi

Peak Positive Phase Duration	
Top Duration	13.50 msec
Right Duration	11.63 msec
Shell Duration	13.15 msec
Average Duration	12.76 msec

Peak Positive Phase Impulse	
Top Impulse	32 psi*msec
Right Impulse	32 psi*msec
Shell Impulse	32 psi*msec
Average Impulse	32 psi*msec

Glazing Response	
Lite	Fractured
Glazing Pullout Length and Location	None
Glazing Tearing	None

Witness Chamber Results
No debris was observed.

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

7.0 Test Results: (Continued)

Test Specimen #3:

Description	Results
Ambient Temperature	70°F
Glazing Temperature	71°F
ASTM Hazard Rating	No Hazard
GSA Performance Condition	2

Peak Positive Pressure	
Top Pressure	4.43 psi
Right Pressure	4.87 psi
Shell Pressure	4.44 psi
Average Pressure	4.58 psi
Witness Chamber Pressure	0.27 psi

Peak Positive Phase Duration	
Top Duration	8.46 msec
Right Duration	10.04 msec
Shell Duration	12.88 msec
Average Duration	10.46 msec

Peak Positive Phase Impulse	
Top Impulse	31 psi*msec
Right Impulse	32 psi*msec
Shell Impulse	32 psi*msec
Average Impulse	32 psi*msec

Glazing Response	
Lite	Fractured
Glazing Pullout Length and Location	None
Glazing Tearing	None

Witness Chamber Results
No debris was observed.

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

7.0 Test Results: (Continued)

Test Specimen #4:

Description	Results
Ambient Temperature	67°F
Glazing Temperature	66°F
ASTM Hazard Rating	High Hazard
GSA Performance Condition	5

Peak Positive Pressure	
Top Pressure	7.06 psi
Right Pressure	7.06 psi
Shell Pressure	6.37 psi
Average Pressure	6.83 psi
Witness Chamber Pressure	0.34 psi

Peak Positive Phase Duration	
Top Duration	13.43 msec
Right Duration	7.78 msec
Shell Duration	13.29 msec
Average Duration	11.50 msec

Peak Positive Phase Impulse	
Top Impulse	45 psi*msec
Right Impulse	45 psi*msec
Shell Impulse	45 psi*msec
Average Impulse	45 psi*msec

Glazing Response	
Lite	Fractured
Glazing Pullout Length and Location	Entire lite deglazed
Glazing Tearing	Safety film tore around entire perimeter of film attachment system

Witness Chamber Results
The glazing fell at the back of the witness chamber, resting against the witness panel.

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

7.0 Test Results: (Continued)

Test Specimen #5:

Description	Results
Ambient Temperature	67°F
Glazing Temperature	66°F
ASTM Hazard Rating	High Hazard
GSA Performance Condition	5

Peak Positive Pressure	
Top Pressure	4.42 psi
Right Pressure	4.64 psi
Shell Pressure	4.44 psi
Average Pressure	4.50 psi
Witness Chamber Pressure	0.21 psi

Peak Positive Phase Duration	
Top Duration	14.54 msec
Right Duration	9.85 msec
Shell Duration	13.97 msec
Average Duration	12.79 msec

Peak Positive Phase Impulse	
Top Impulse	32 psi*msec
Right Impulse	31 psi*msec
Shell Impulse	32 psi*msec
Average Impulse	32 psi*msec

Glazing Response	
Lite	Fractured
Glazing Pullout Length and Location	100-1/2" total (47%) at head, sill, and stile
Glazing Tearing	Safety film tore at film attachment system in areas that deglazed

Witness Chamber Results
A large quantity of fragments were located past the 1m mark on the witness chamber floor with 23 fragment indents located at a height of 23" from the floor on the witness panel.

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

7.0 Test Results: (Continued)

Test Specimen #6:

Description	Results
Ambient Temperature	67°F
Glazing Temperature	66°F
ASTM Hazard Rating	Low Hazard
GSA Performance Condition	5

Peak Positive Pressure	
Top Pressure	4.56 psi
Right Pressure	5.06 psi
Shell Pressure	4.61 psi
Average Pressure	4.74 psi
Witness Chamber Pressure	0.21 psi

Peak Positive Phase Duration	
Top Duration	11.82 msec
Right Duration	11.70 msec
Shell Duration	13.72 msec
Average Duration	12.41 msec

Peak Positive Phase Impulse	
Top Impulse	33 psi*msec
Right Impulse	33 psi*msec
Shell Impulse	33 psi*msec
Average Impulse	33 psi*msec

Glazing Response	
Lite	Fractured
Glazing Pullout Length and Location	89-1/2" total (39%) at head, sill, and stiles
Glazing Tearing	Safety film tore at film attachment system in areas that deglazed

Witness Chamber Results
A large quantity of fragments were located past the 1m mark on the witness chamber floor with 15 fragment indents in the witness panel, 4 located above a height of 20" from the floor.

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

Intertek-ATI will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Intertek-ATI for the entire test record retention period.

Results obtained are tested values and were secured using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimens tested. This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For Intertek-ATI:

Emily C. Riley
Project Manager

Joseph A. Reed, P.E.
Director - Engineering

ECR/jar:jas

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix A - Test Facility (1)
- Appendix B - Pressure Time Plots (12)
- Appendix C - Photographs (14)
- Appendix D - Drawings (13)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	02/27/15	N/A	Original report issue



E1272.02-119-12

APPENDIX A

Test Facility



Figure #1
Shock Tube and Test Facility

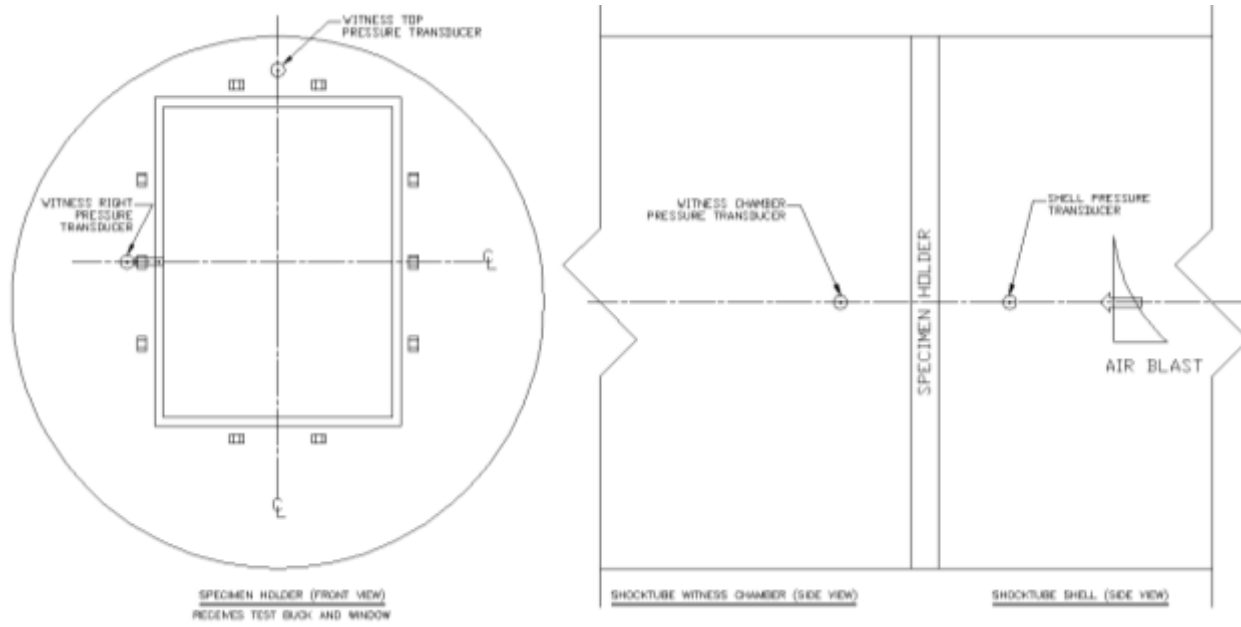


Figure #2
Pressure Sensor Locations

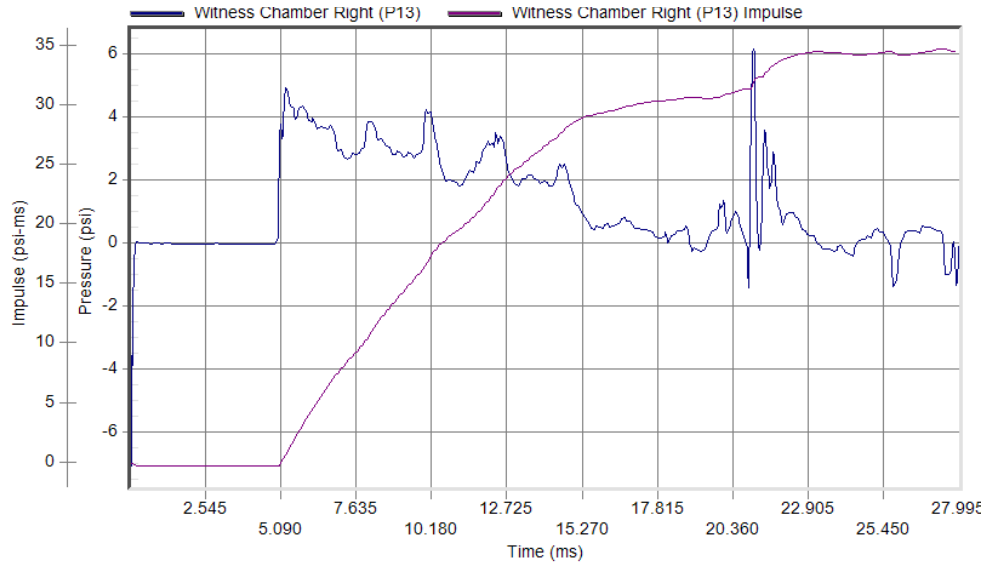


E1272.02-119-12

APPENDIX B

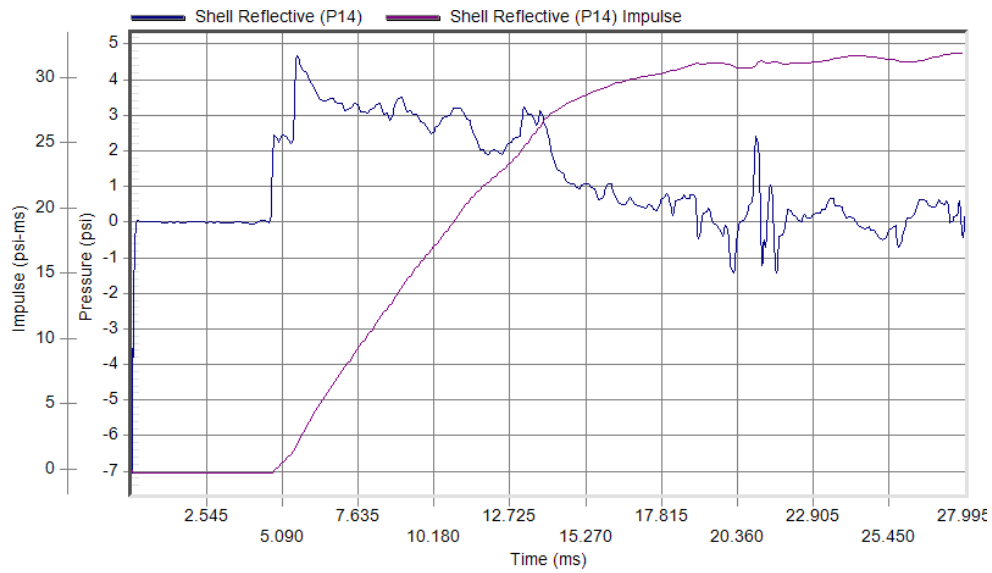
Pressure Time Plots

Specimen #1



Peak Pressure: 6.17 psi at 21.07 ms
Duration: 0.15 ms

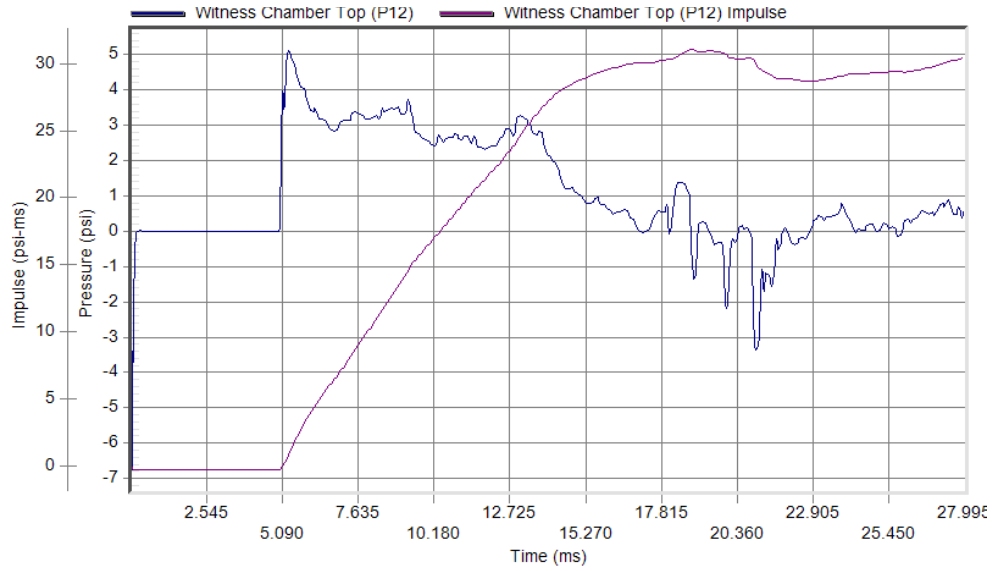
Test Date: 12/19/2014
Test Time: 12:02 pm



Peak Pressure: 4.75 psi at 5.60 ms
Duration: 13.40 ms

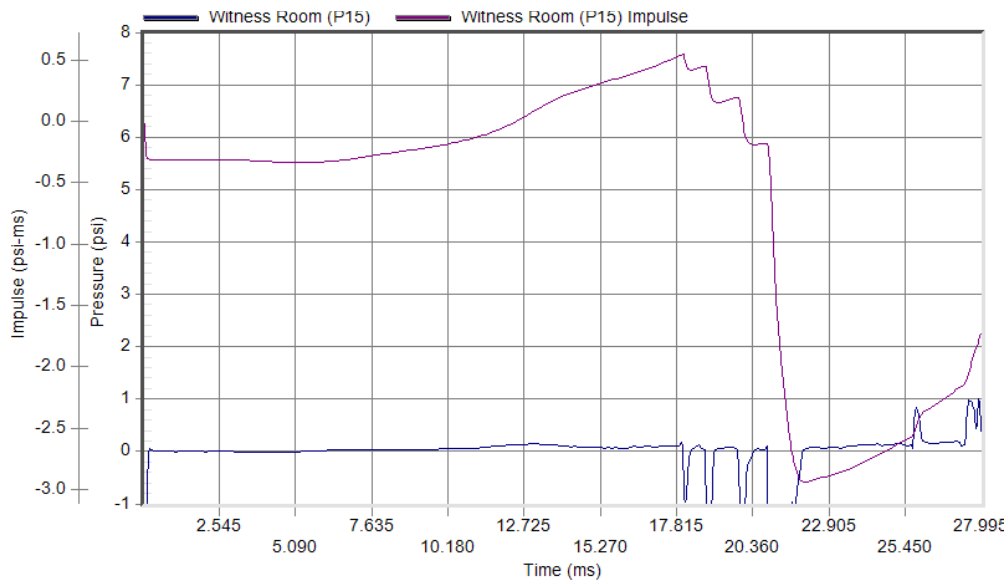
Test Date: 12/19/2014
Test Time: 12:02 pm

Specimen #1: (Continued)



Peak Pressure: 5.16 psi at 5.32 ms
Duration: 11.72 ms

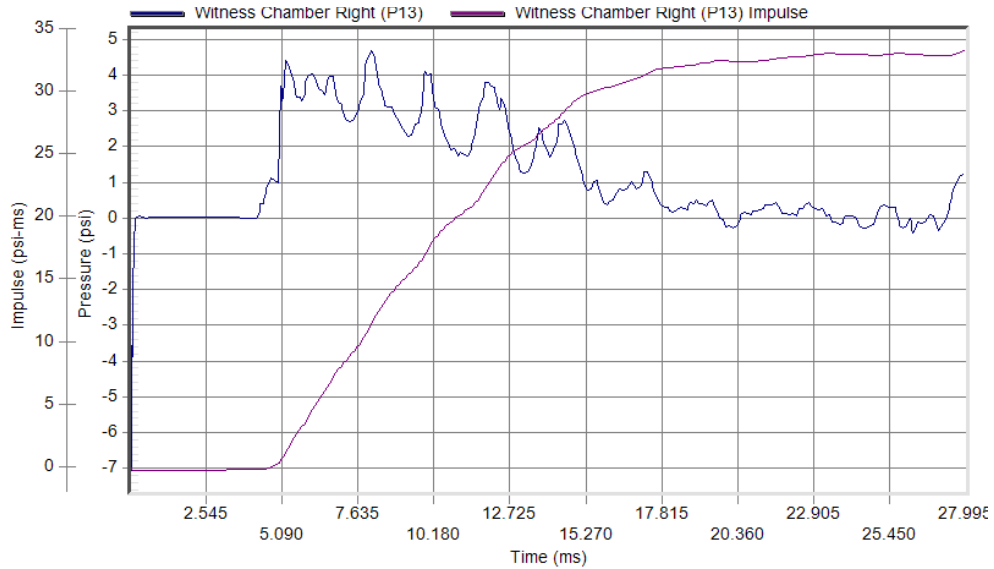
Test Date: 12/19/2014
Test Time: 12:02 pm



Peak Pressure: 1.04 psi at 27.61 ms
Duration: 0.00 ms

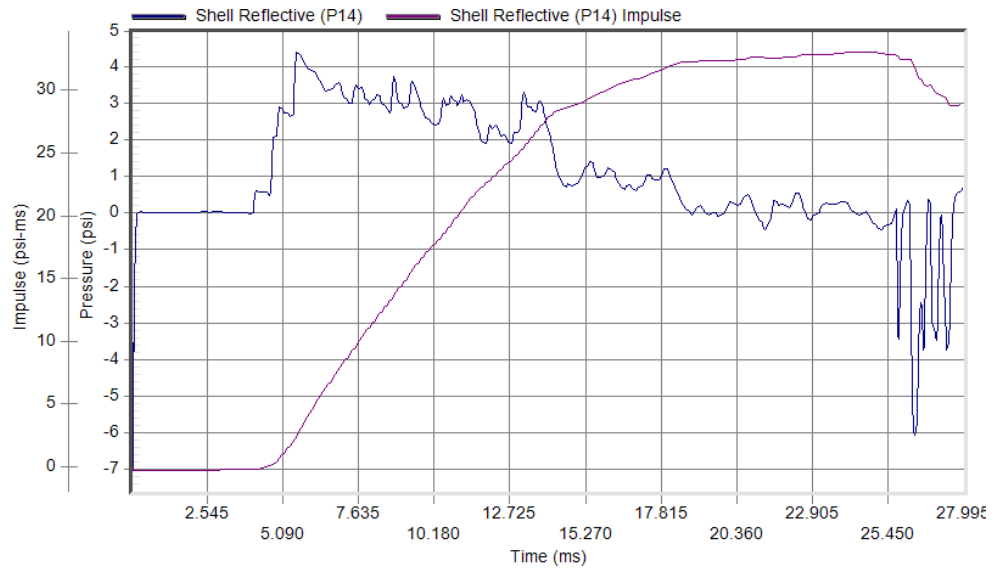
Test Date: 12/19/2014
Test Time: 12:02 pm

Specimen #2



Peak Pressure: 4.73 psi at 8.12 ms
Duration: 11.63 ms

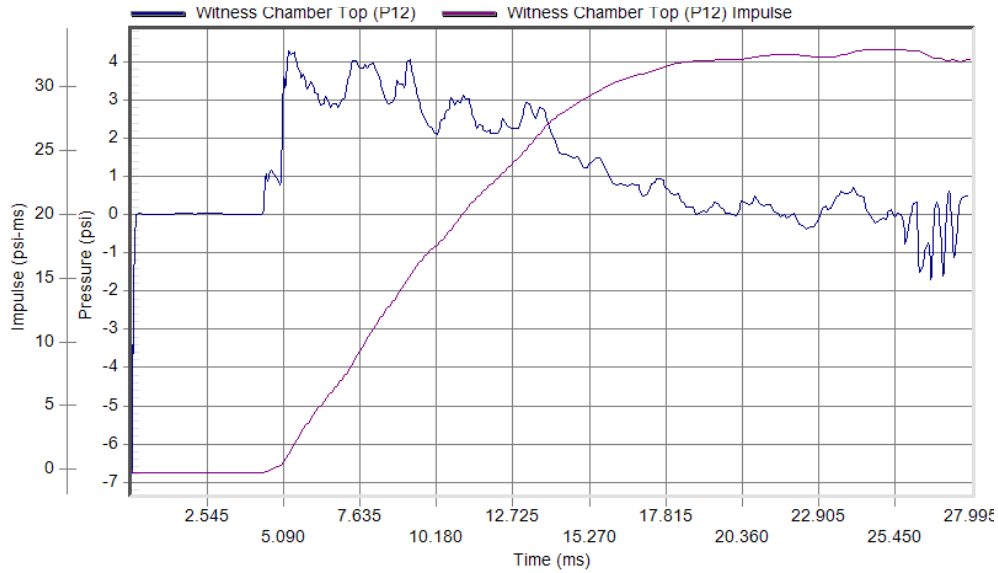
Test Date: 10/22/2014
Test Time: 9:00 am



Peak Pressure: 4.42 psi at 5.58 ms
Duration: 13.15 ms

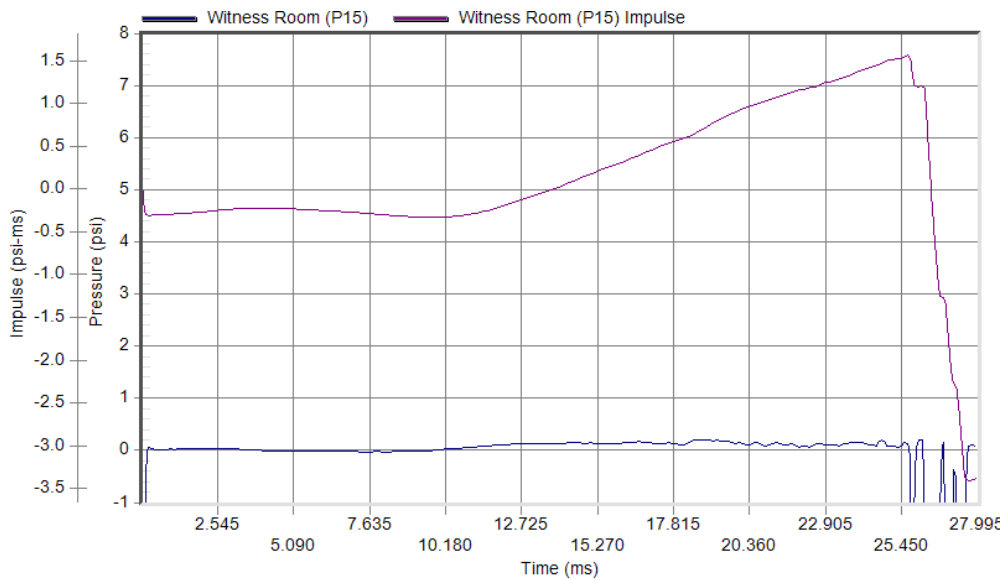
Test Date: 10/22/2014
Test Time: 9:00 am

Specimen #2: (Continued)



Peak Pressure: 4.33 psi at 5.30 ms
Duration: 13.50 ms

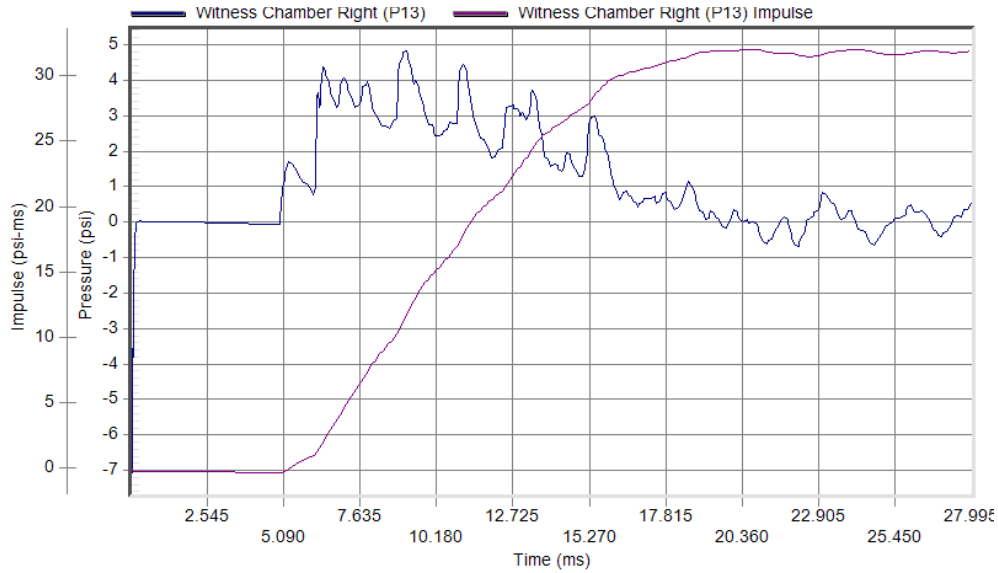
Test Date: 10/22/2014
Test Time: 9:00 am



Peak Pressure: 0.21 psi at 26.06 ms
Duration: 0.11 ms

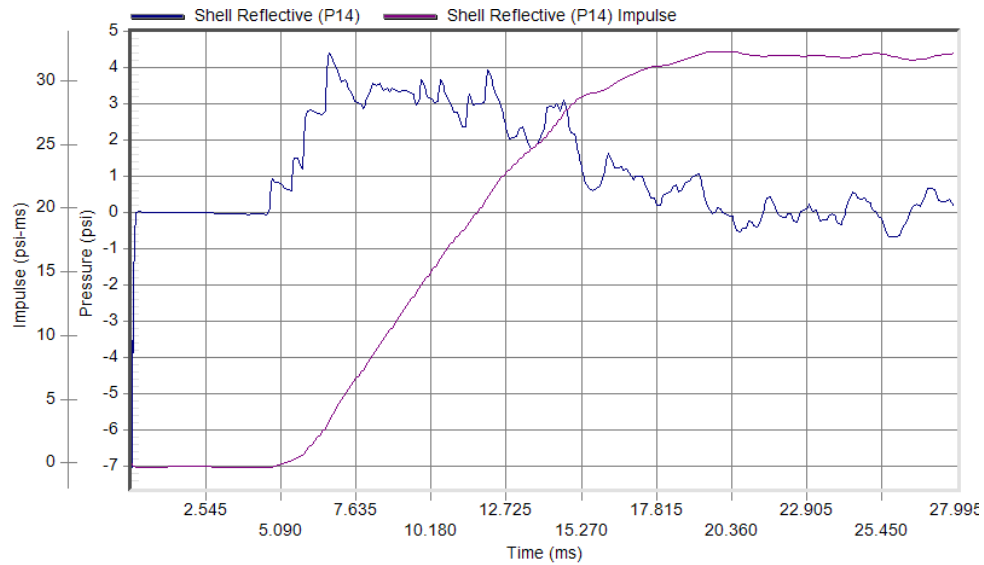
Test Date: 10/22/2014
Test Time: 9:00 am

Specimen #3



Peak Pressure: 4.87 psi at 9.13 ms
Duration: 10.04 ms

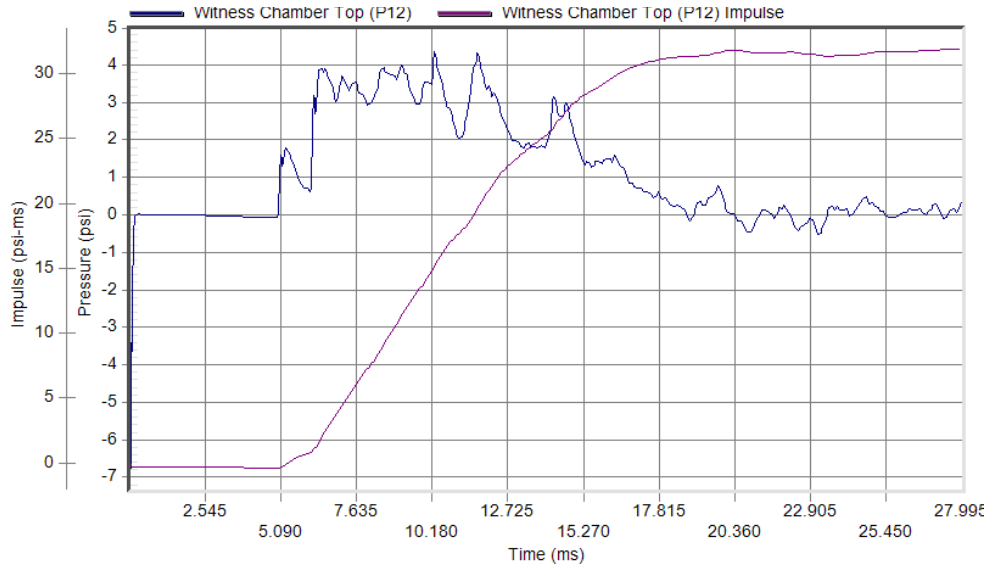
Test Date: 9/24/2014
Test Time: 3:45 pm



Peak Pressure: 4.44 psi at 6.75 ms
Duration: 12.88 ms

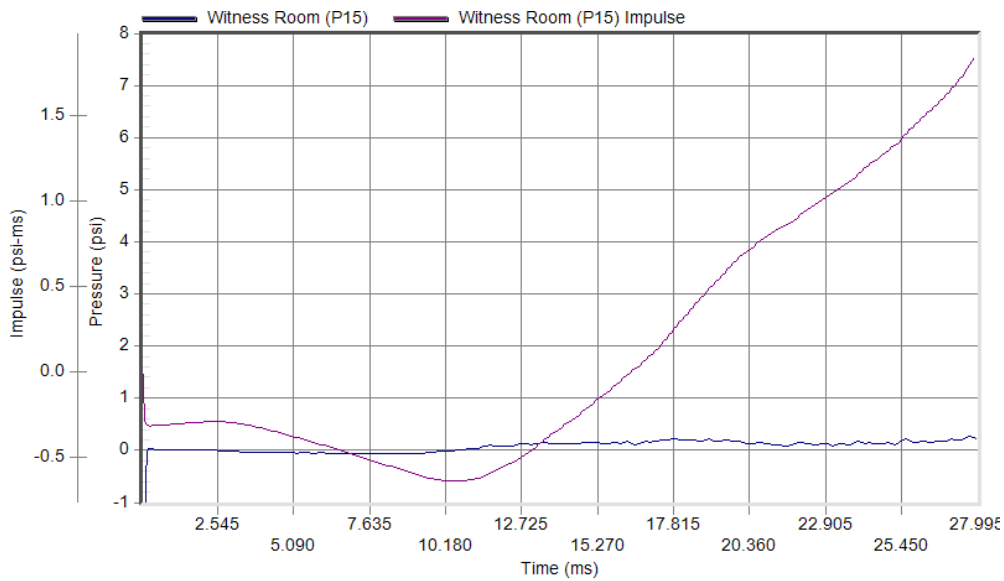
Test Date: 9/24/2014
Test Time: 3:45 pm

Specimen #3: (Continued)



Peak Pressure: 4.43 psi at 10.27 ms
Duration: 8.46 ms

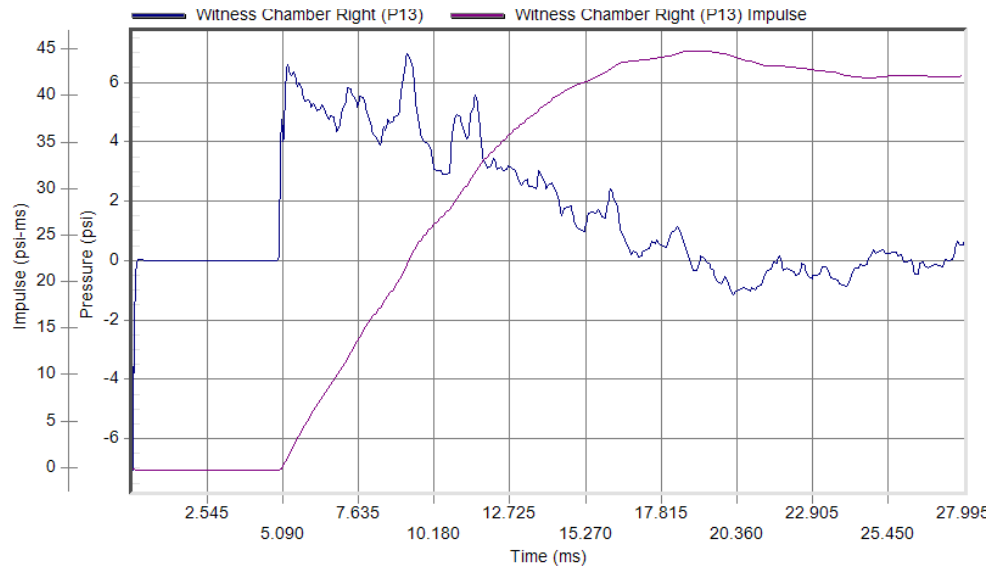
Test Date: 9/24/2014
Test Time: 3:45 pm



Peak Pressure: 0.27 psi at 27.70 ms
Duration: 0.00 ms

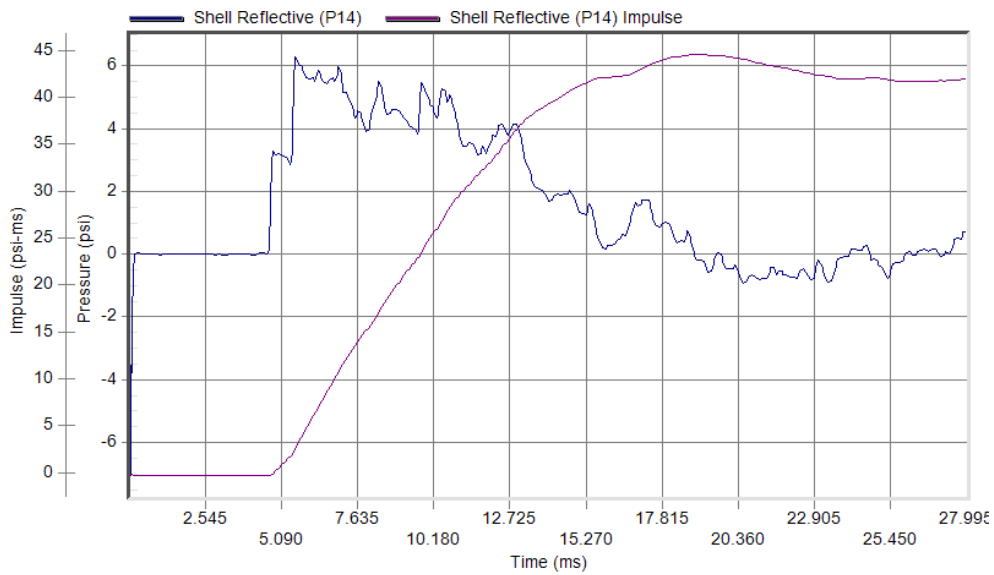
Test Date: 9/24/2014
Test Time: 3:45 pm

Specimen #4



Peak Pressure: 7.06 psi at 9.29 ms
Duration: 7.78 ms

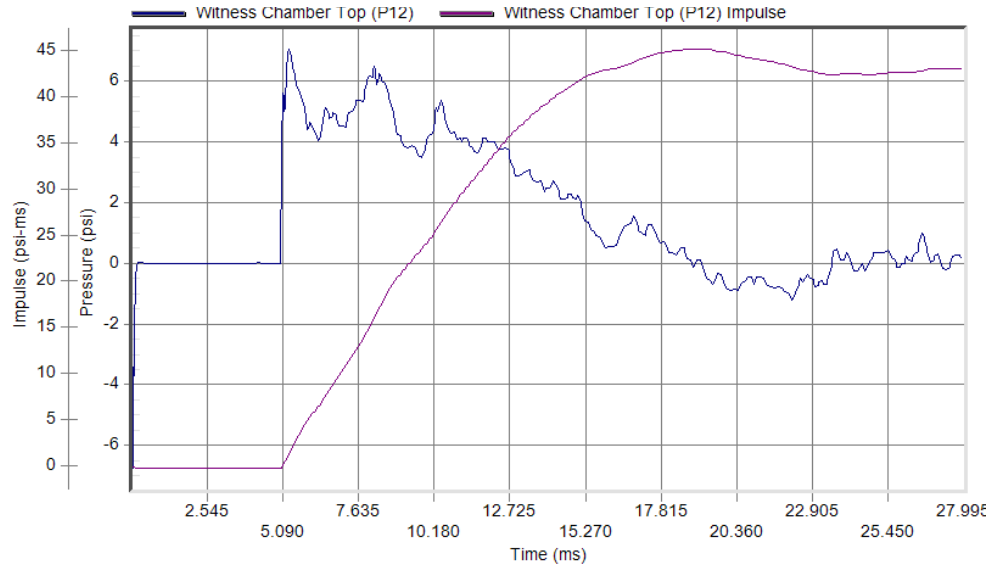
Test Date: 10/20/2014
Test Time: 1:40 pm



Peak Pressure: 6.37 psi at 5.58 ms
Duration: 13.29 ms

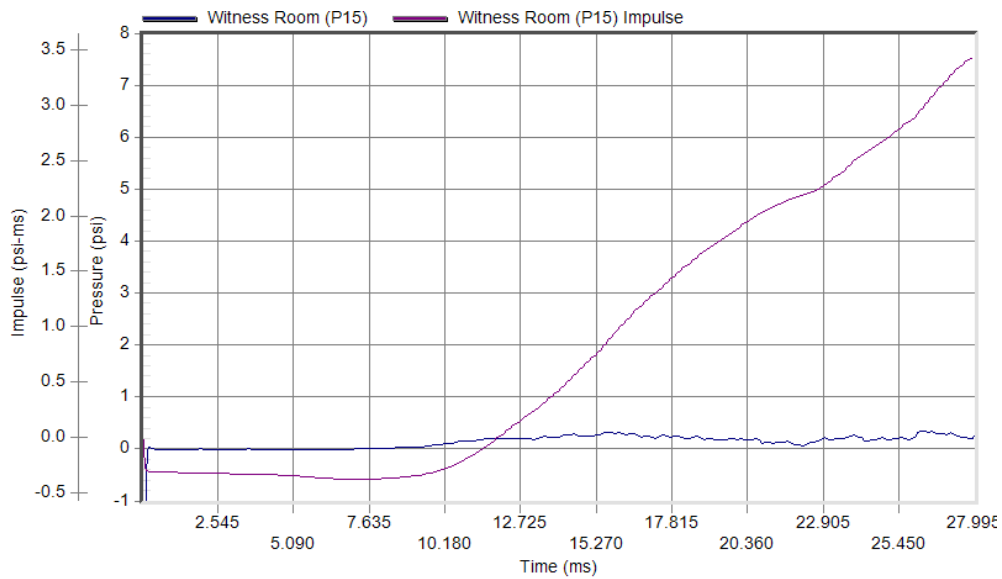
Test Date: 10/20/2014
Test Time: 1:40 pm

Specimen #4: (Continued)



Peak Pressure: 7.06 psi at 5.31 ms
Duration: 13.43 ms

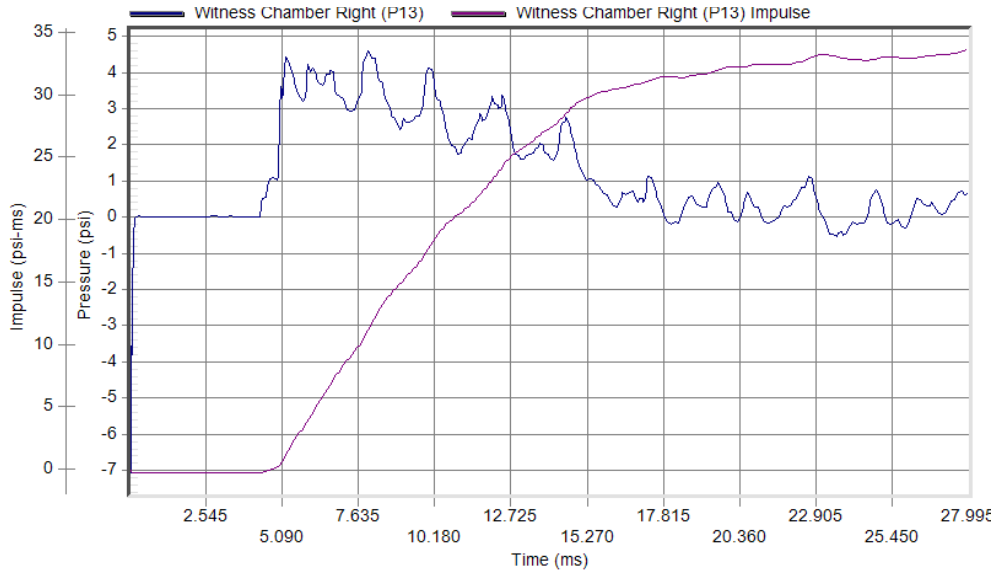
Test Date: 10/20/2014
Test Time: 1:40 pm



Peak Pressure: 0.34 psi at 26.51 ms
Duration: 0.00 ms

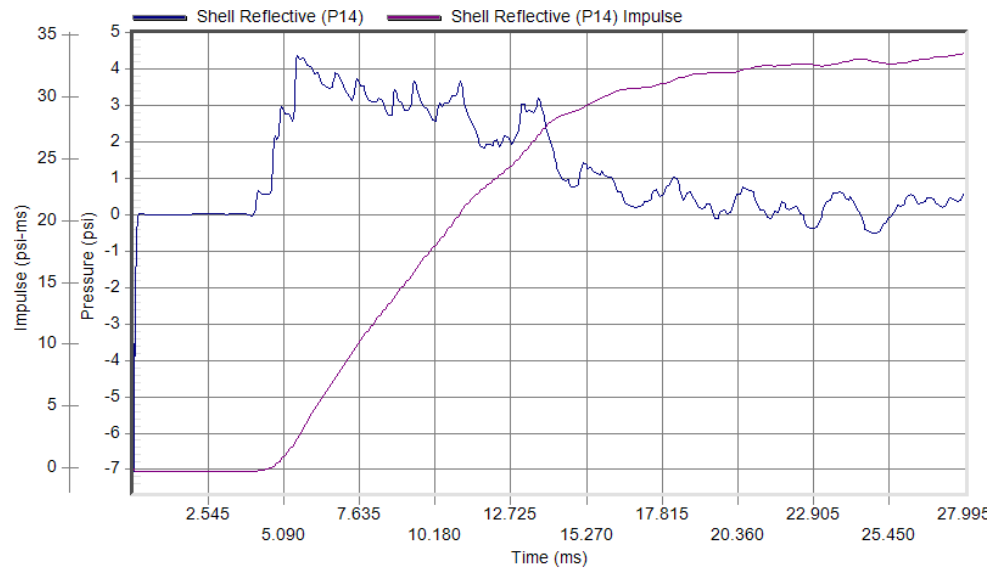
Test Date: 10/20/2014
Test Time: 1:40 pm

Specimen #5



Peak Pressure: 4.64 psi at 7.99 ms
Duration: 9.85 ms

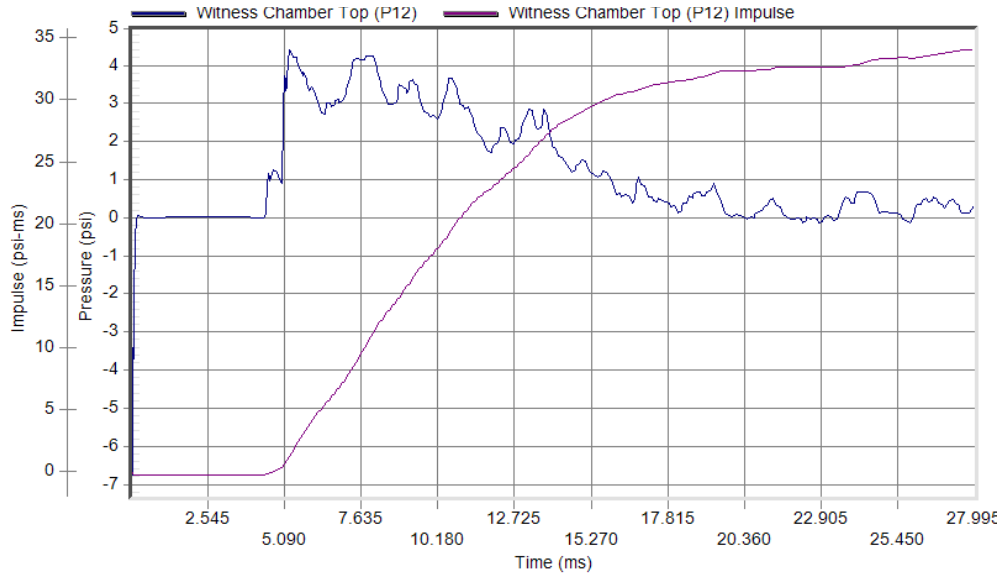
Test Date: 10/21/2014
Test Time: 8:08 am



Peak Pressure: 4.44 psi at 5.56 ms
Duration: 13.97 ms

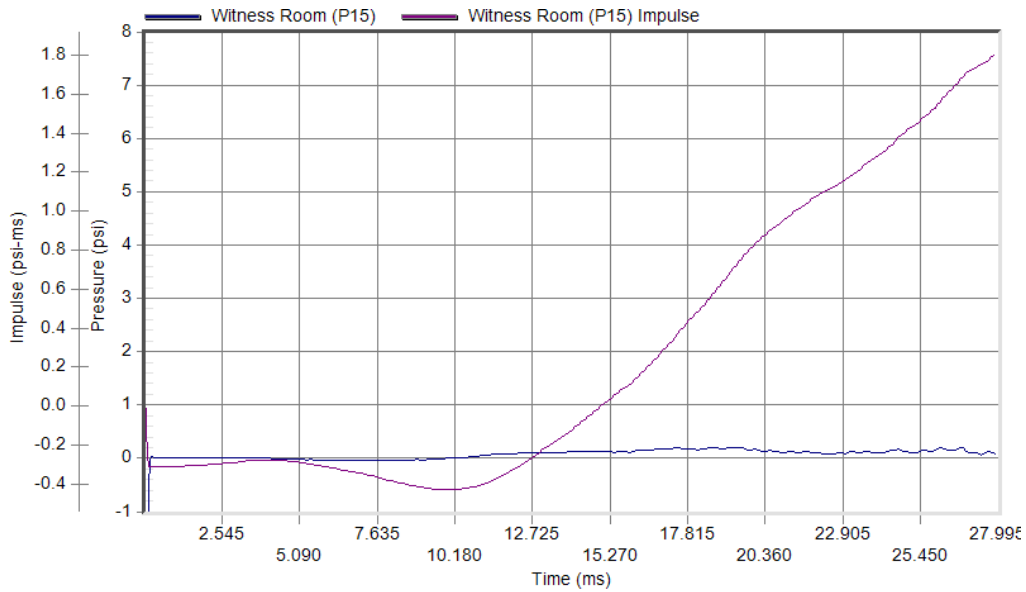
Test Date: 10/21/2014
Test Time: 8:08 am

Specimen #5: (Continued)



Peak Pressure: 4.42 psi at 5.30 ms
Duration: 14.54 ms

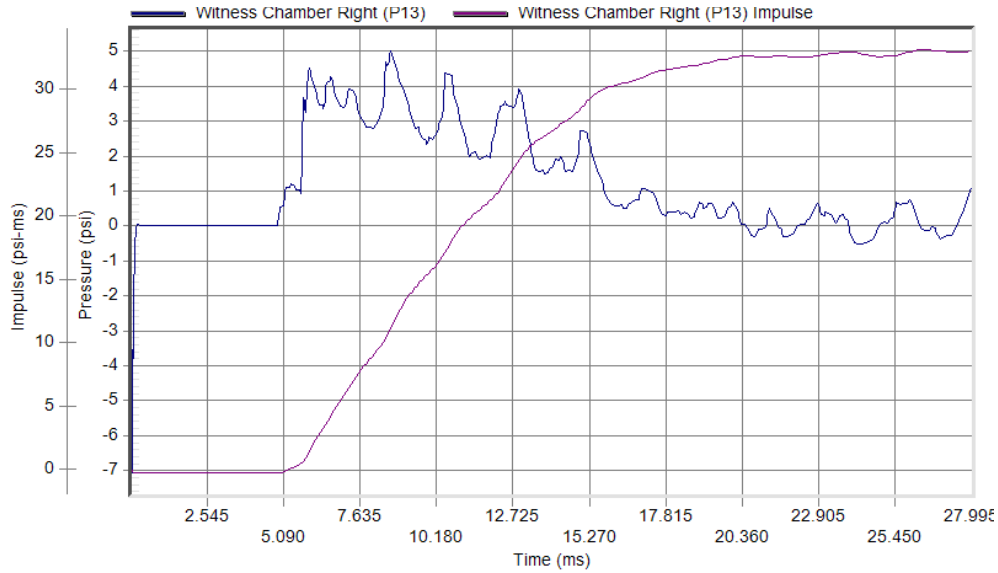
Test Date: 10/21/2014
Test Time: 8:08 am



Peak Pressure: 0.21 psi at 19.57 ms
Duration: 0.00 ms

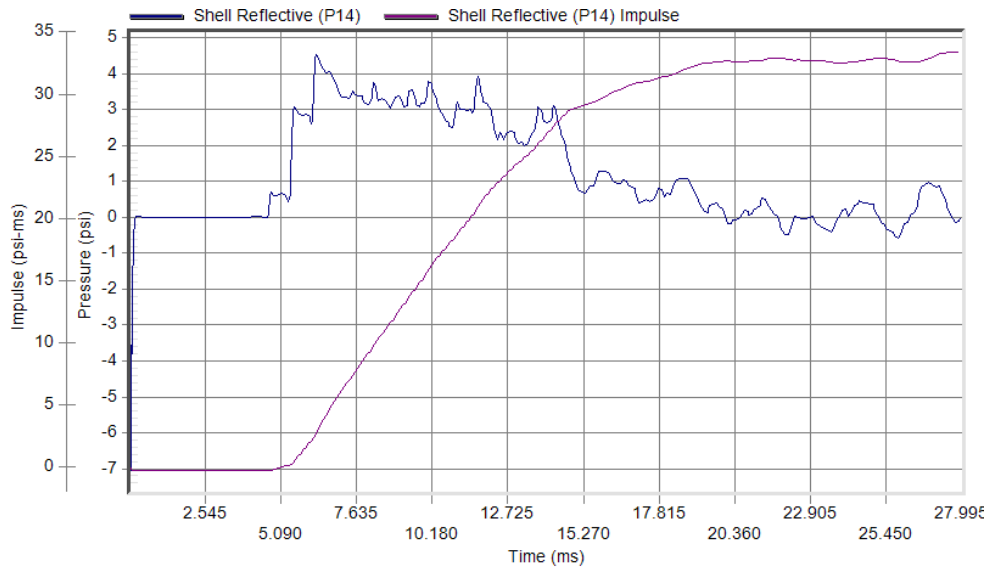
Test Date: 10/21/2014
Test Time: 8:08 am

Specimen #6



Peak Pressure: 5.06 psi at 8.67 ms
Duration: 11.70 ms

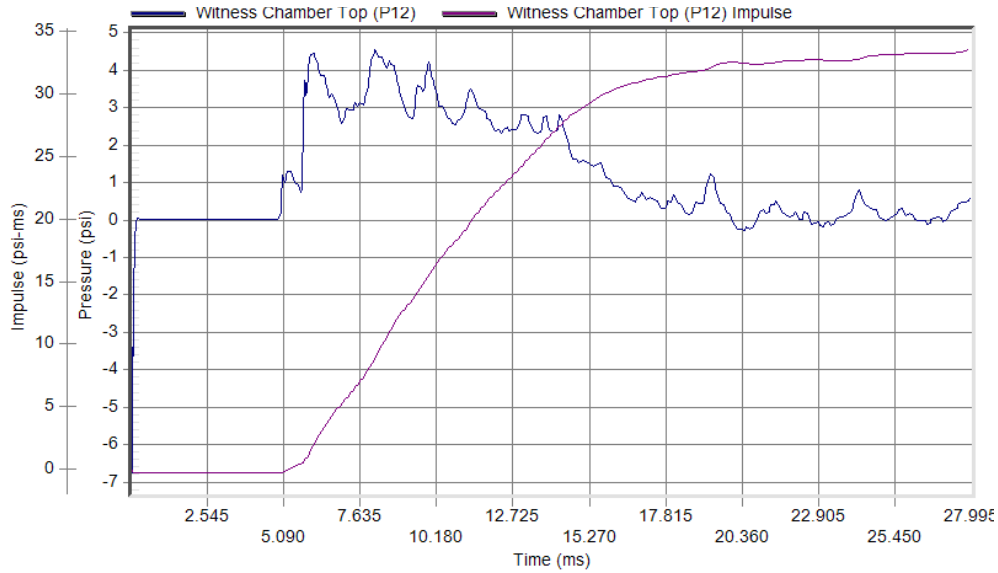
Test Date: 10/23/2014
Test Time: 2:41 pm



Peak Pressure: 4.61 psi at 6.30 ms
Duration: 13.72 ms

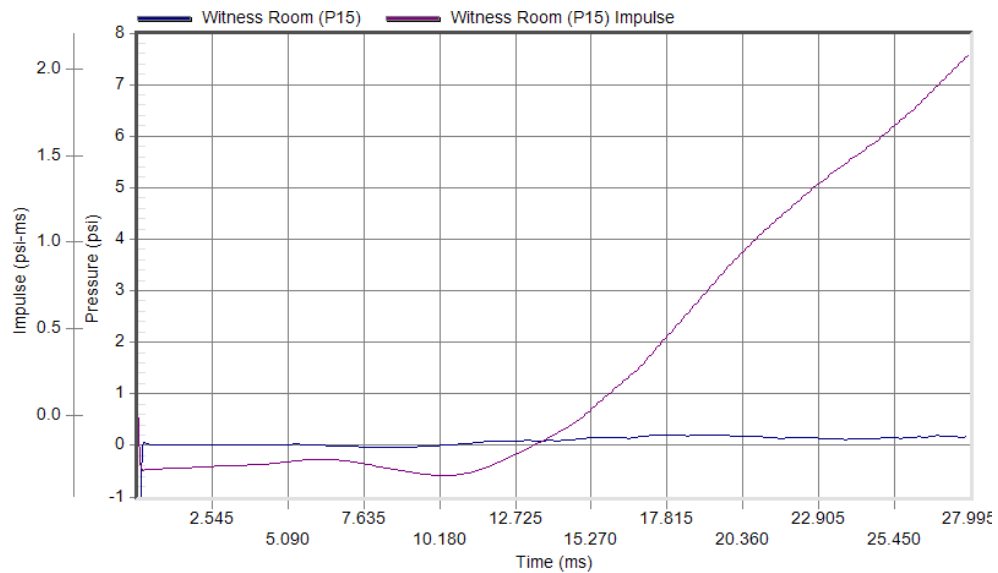
Test Date: 10/23/2014
Test Time: 2:41 pm

Specimen #6: (Continued)



Peak Pressure: 4.56 psi at 8.17 ms
Duration: 11.82 ms

Test Date: 10/23/2014
Test Time: 2:41 pm



Peak Pressure: 0.21 psi at 17.50 ms
Duration: 0.00 ms

Test Date: 10/23/2014
Test Time: 2:41 pm



E1272.02-119-12

APPENDIX C

Photographs

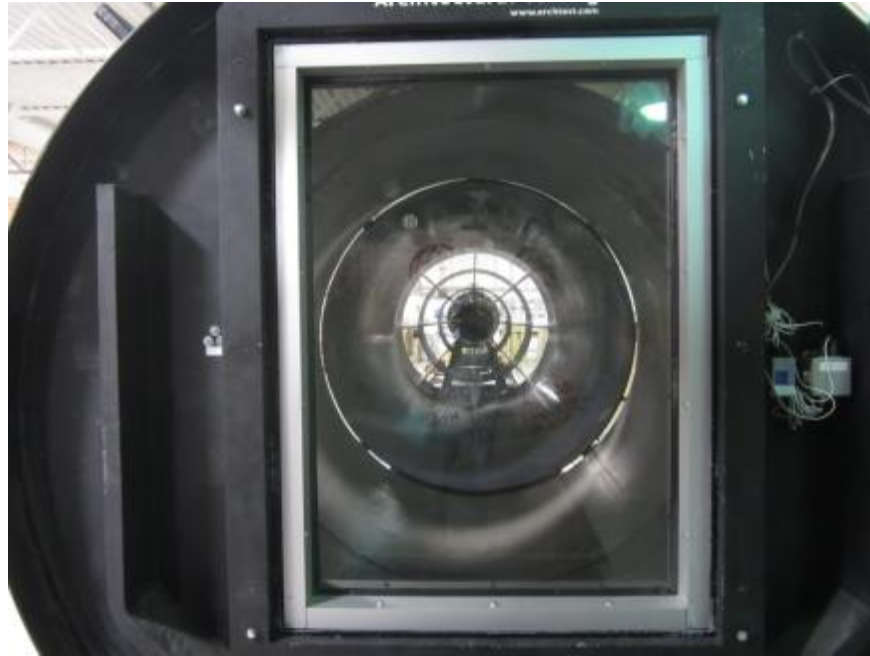


Photo No. 1
Pre-test Specimen #1, Interior

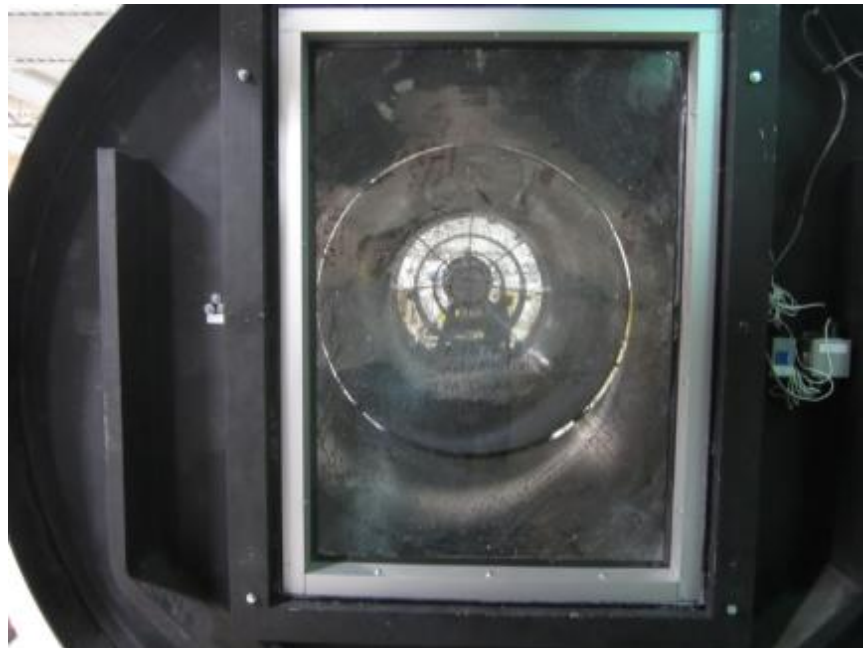


Photo No. 2
Post-test Specimen #1, Interior

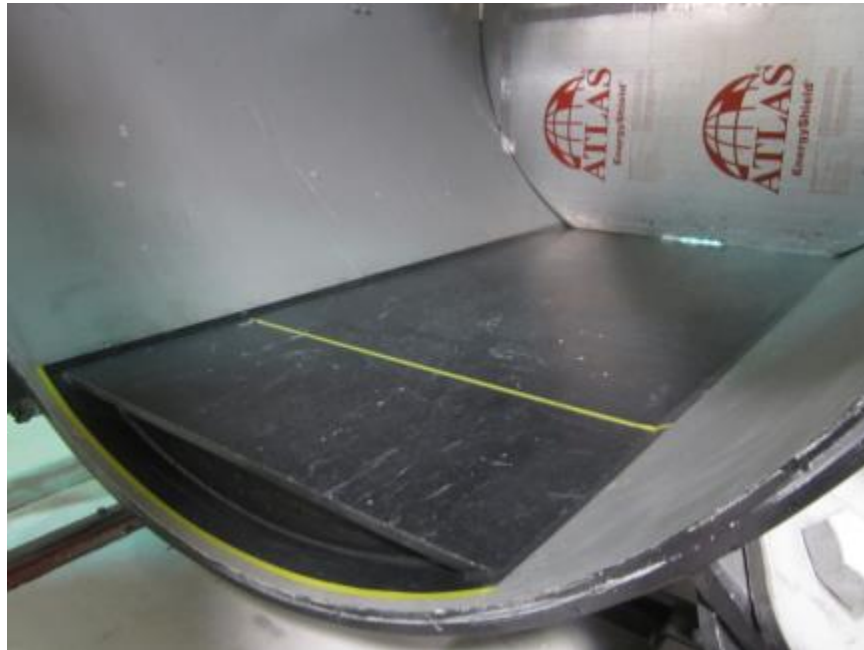


Photo No. 3
Post-test Specimen #1, Witness Chamber

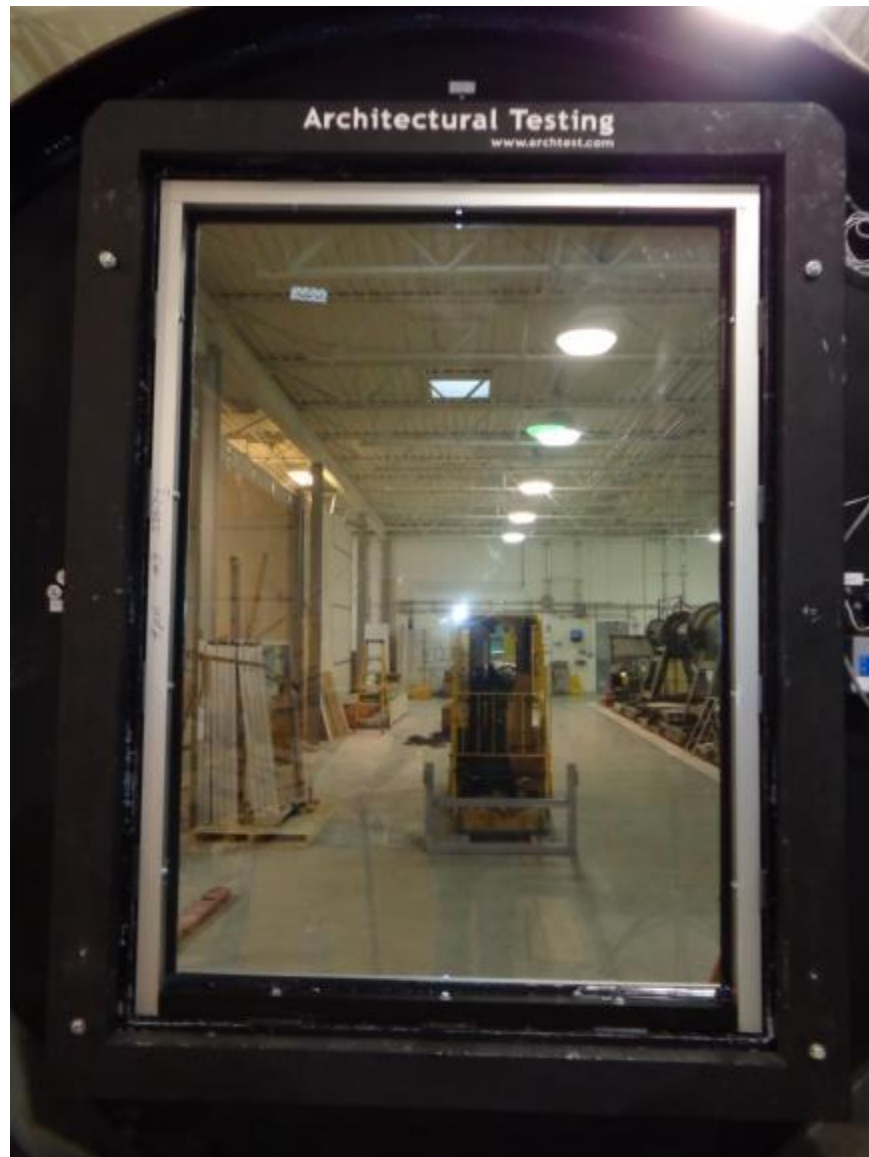


Photo No. 4
Pre-test Specimen #2, Interior



Photo No. 5
Post-test Specimen #2, Interior

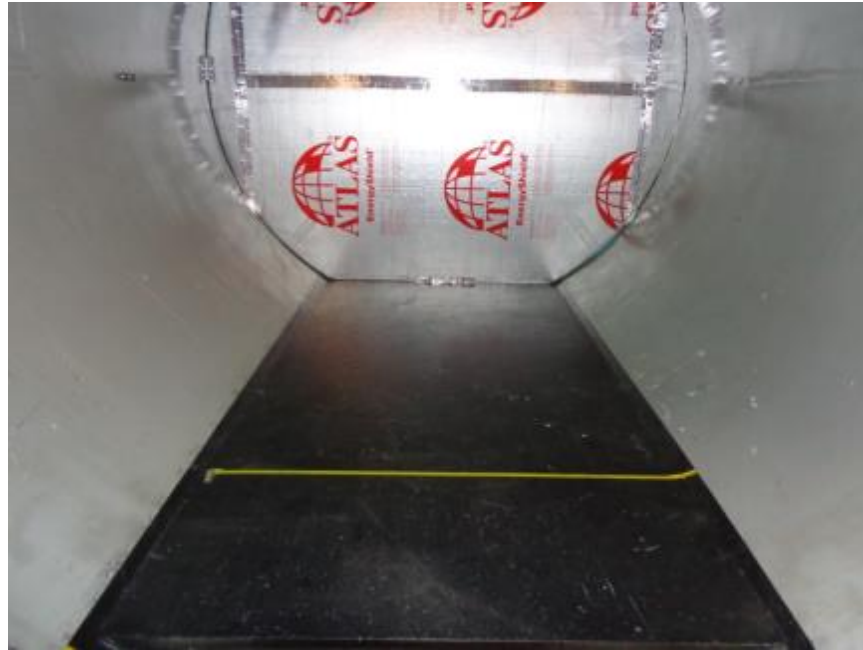


Photo No. 6
Post-test Specimen #2, Witness Chamber

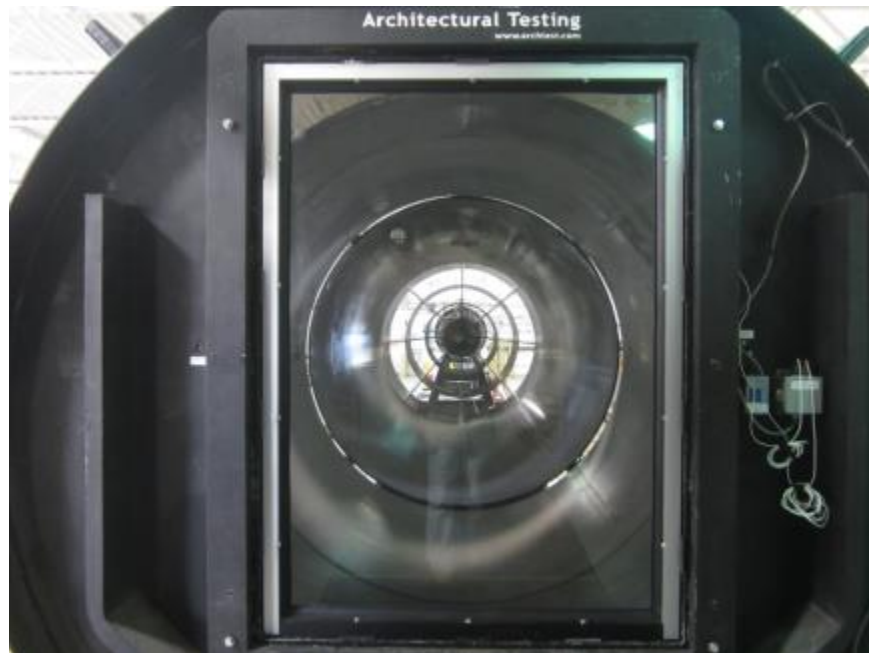


Photo No. 7
Pre-test Specimen #3, Interior

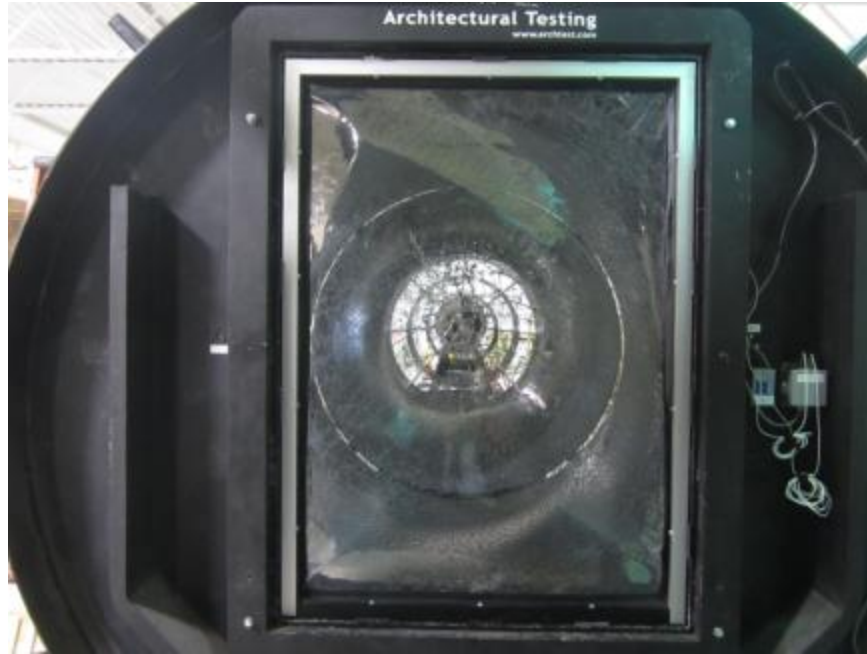


Photo No. 8
Post-test Specimen #3, Interior

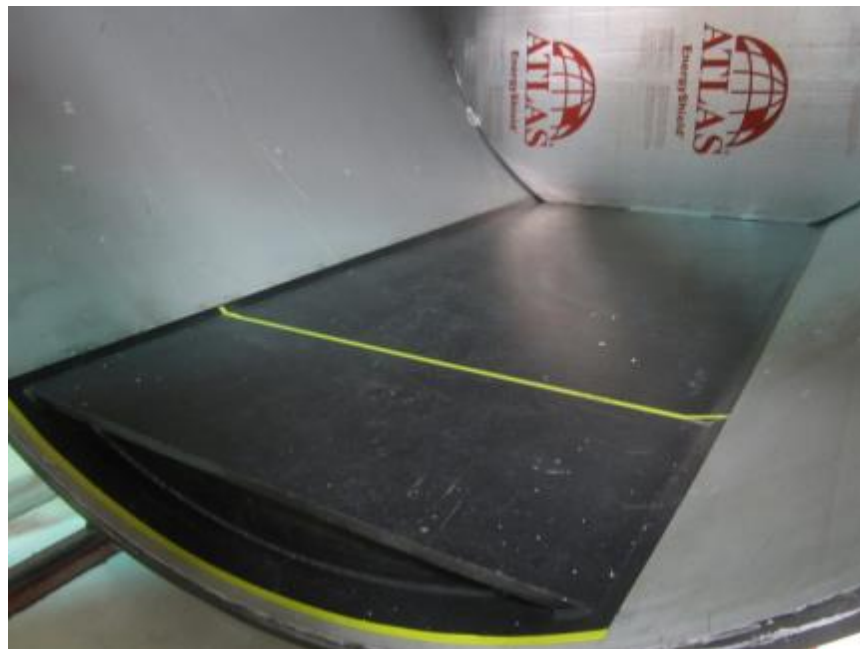


Photo No. 9
Post-test Specimen #3, Witness Chamber



Photo No. 10
Pre-test Specimen #4, Interior

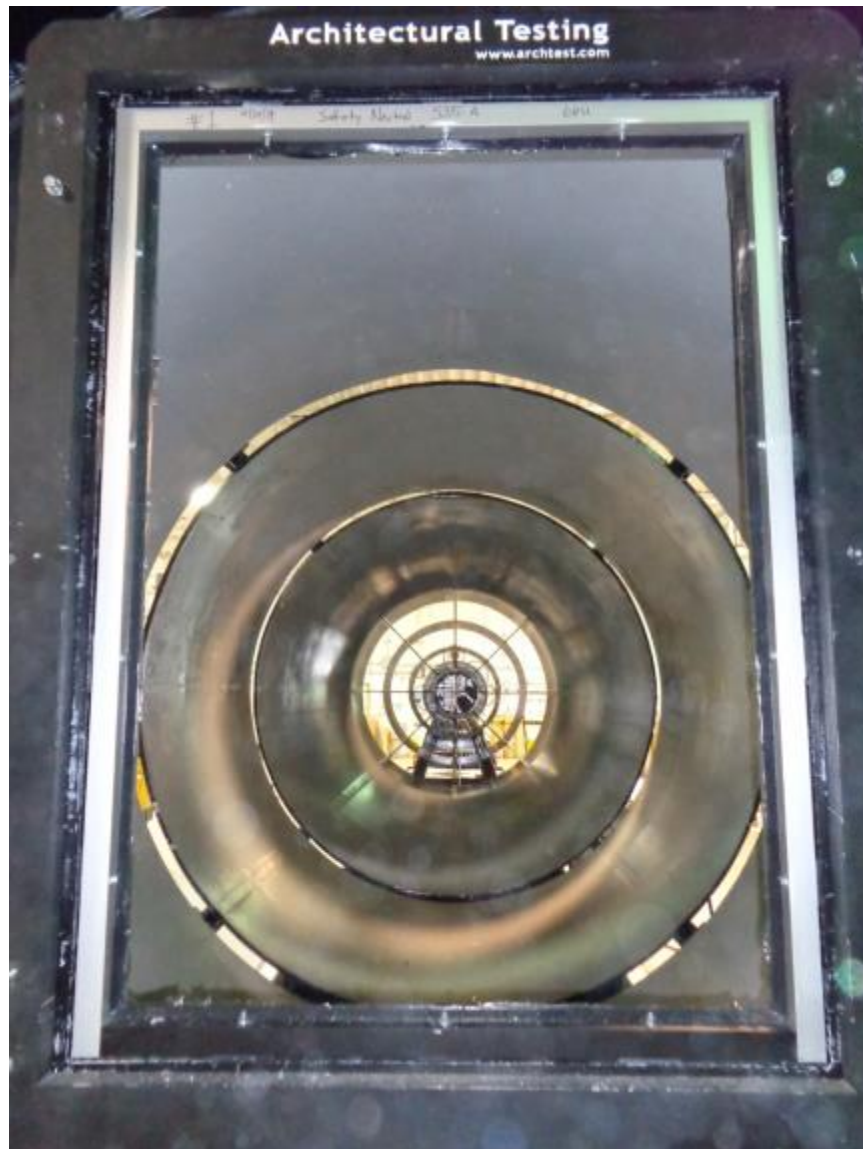


Photo No. 11
Post-test Specimen #4, Interior

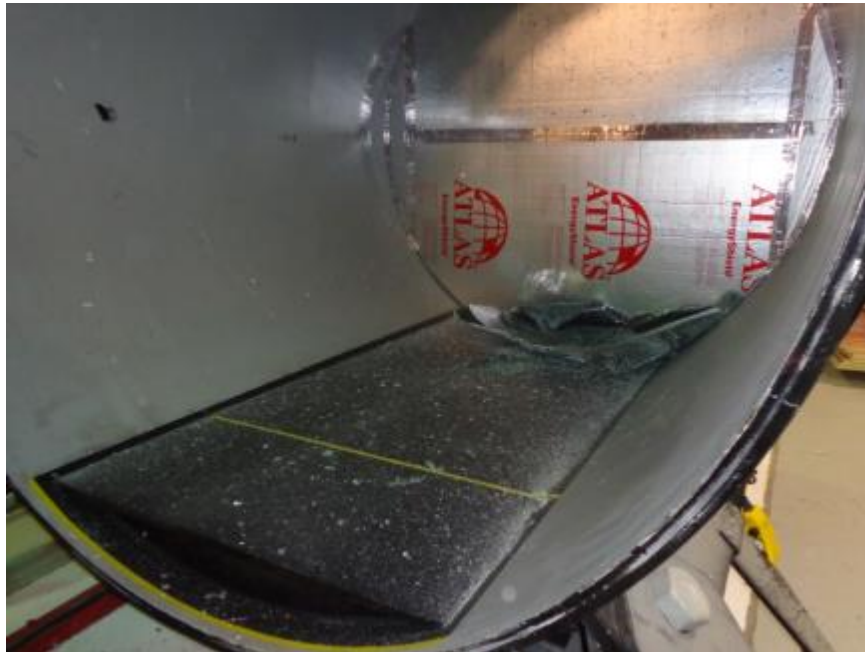


Photo No. 12
Post-test Specimen #4, Witness Chamber

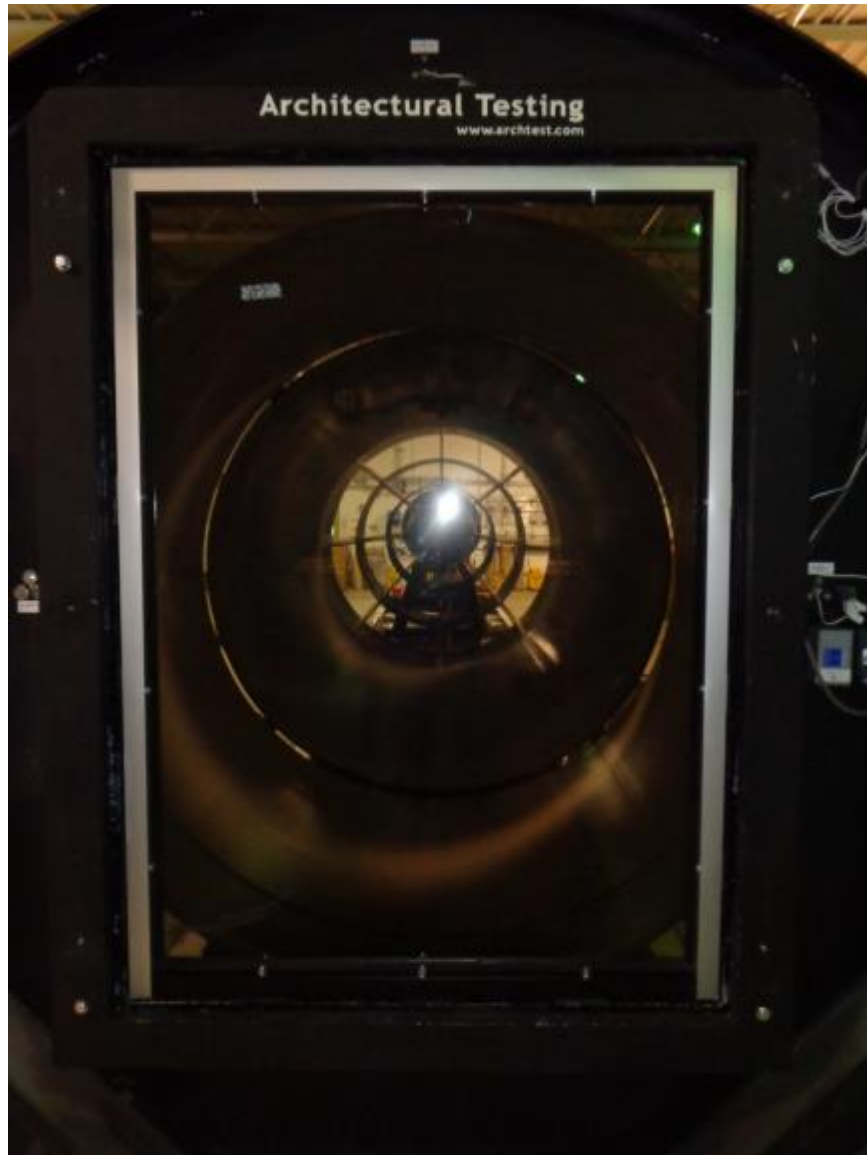


Photo No. 13
Pre-test Specimen #5, Interior

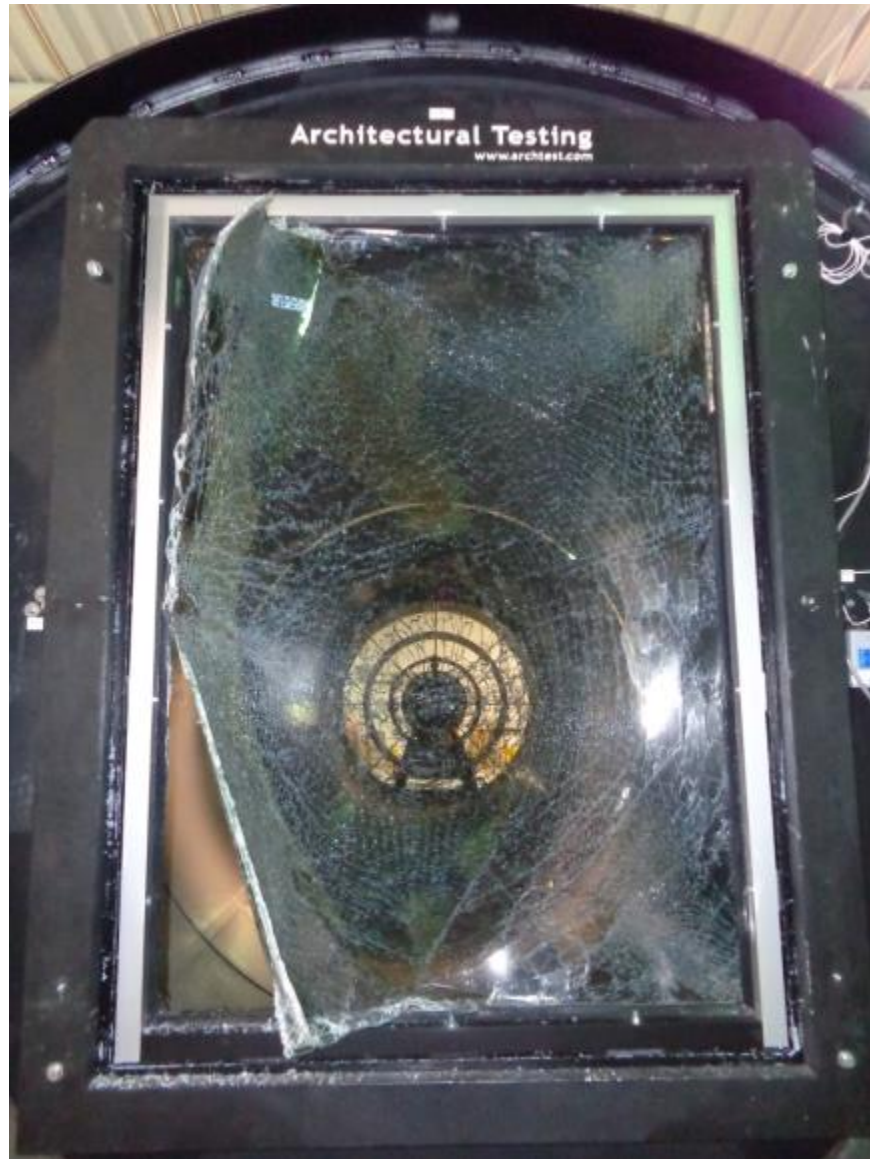


Photo No. 14
Post-test Specimen #5, Interior

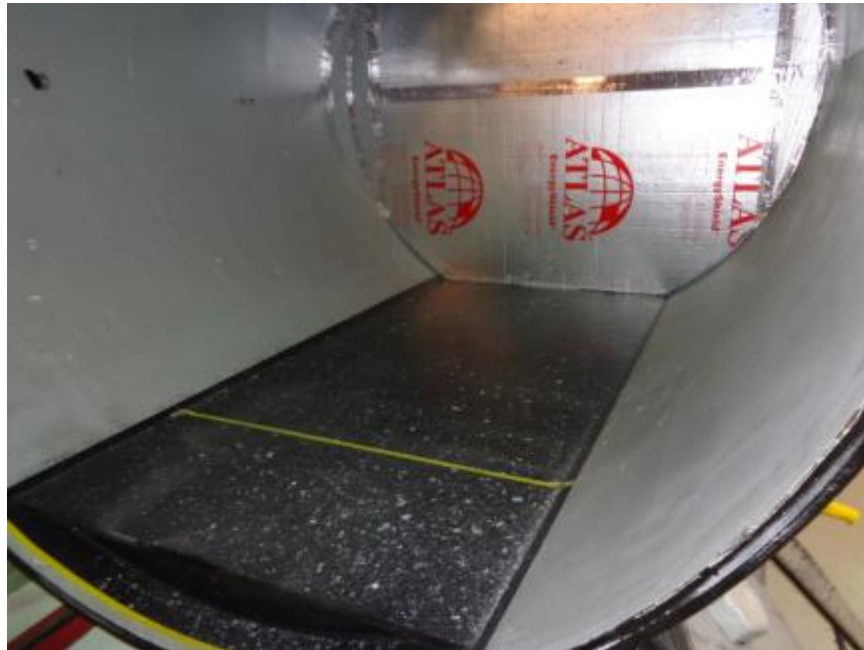


Photo No. 15
Post-test Specimen #5, Witness Chamber



Photo No. 16
Pre-test Specimen #6, Interior

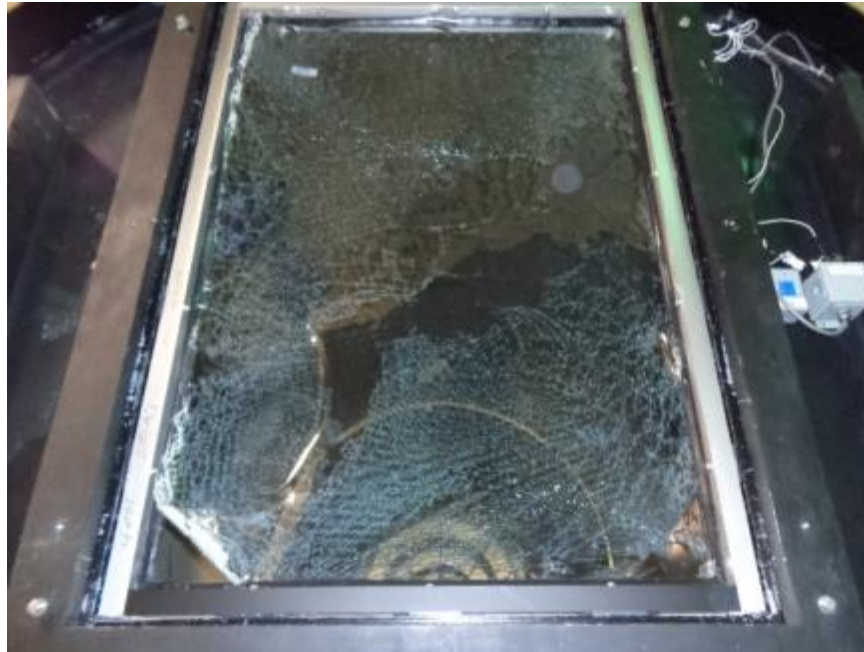


Photo No. 17
Post-test Specimen #6, Interior

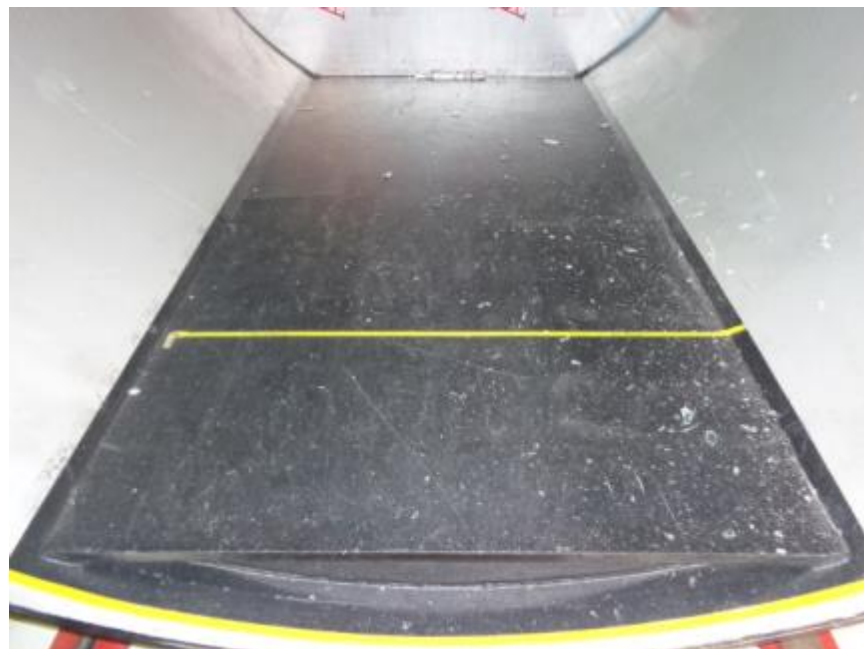


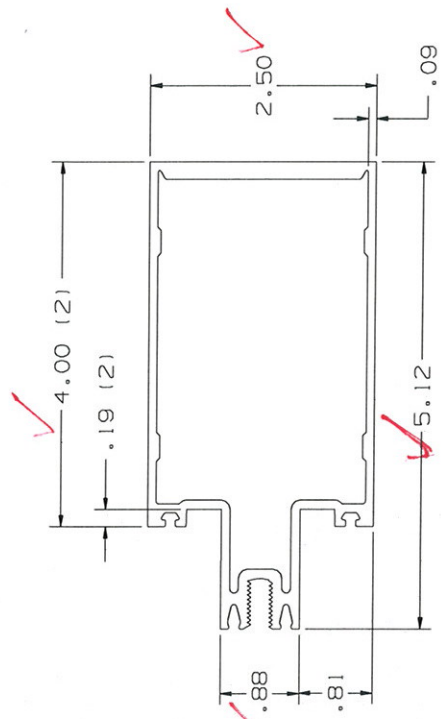
Photo No. 18
Post-test Specimen #6, Witness Chamber



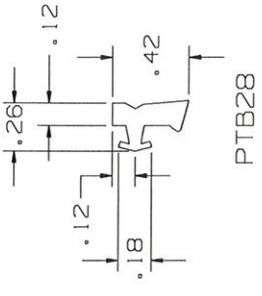
E1272.02-119-12

APPENDIX D

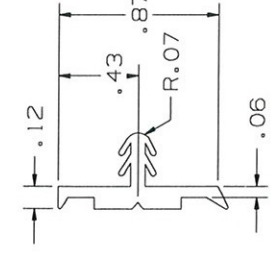
Drawings



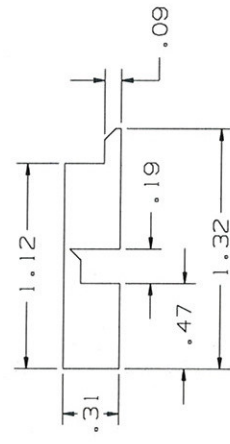
E4TB223



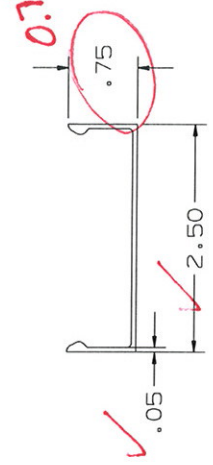
PTB28



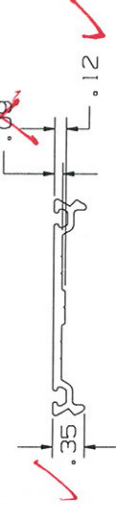
PTB94



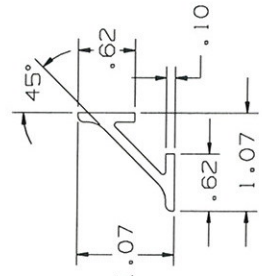
P946



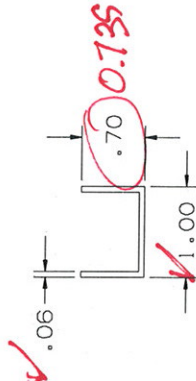
E4TB64



E4TB224



BP950



PTB94
C-CHANNEL SPACER
(BY MIDLAND GLASS CO.)

NOTES:

- 1. REFERENCE DRAWING ONLY.
- 2. PART NUMBERS OF COMPONENTS ARE SHOWN IN EACH VIEW.
- 3. PART SUPPLIER : TUBELITE INC. WWW.TUBELITE.INC.COM



Test sample complies with these details.
Deviations are noted.

Report # **E1727**
Date **2/13/15** Tech **GRK**

DESIGN REFERENCE	NEXT ASSEMBLY	REV	ECO	ISSUE DATE AND DESCRIPTION	DRAFT	CHKD
011				FEB 02, 2015		
ISSUE DATE AND DESCRIPTION	DATE	DATE	DATE	DATE	DATE	DATE
FEB 02, 2015	FEB 02, 2015	FEB 02, 2015	FEB 02, 2015	FEB 02, 2015	FEB 02, 2015	FEB 02, 2015
<p>3M This document is the property of 3M and is not to be reproduced or further disseminated outside of 3M without the express written permission of 3M.</p> <p>TITLE: TUBELITE 400 SERIES CURTAIN WALL COMPONENTS</p>						
<p>DO NOT SCALE DRAWING</p> <p>THIRD ANGLE PROJECTION</p> <p>INTERPRET PER ASME Y14.5 - 2009</p> <p>MIN. SURFACE ROUGHNESS</p> <p>FINISH SURFACES</p> <p>ANGLES : 0.1°</p>						
<p>SCALE: 1" = 1"</p> <p>INCHES: .0005, .001, .002, .005, .010, .015, .020, .030, .040, .050, .060, .070, .080, .090, .100, .120, .150, .200, .250, .300, .400, .500, .600, .750, 1.000, 1.250, 1.500, 2.000, 2.500, 3.000, 4.000, 5.000, 6.000, 8.000, 10.000</p> <p>MILLIMETERS: .001, .002, .005, .010, .015, .020, .030, .040, .050, .060, .070, .080, .090, .100, .120, .150, .200, .250, .300, .400, .500, .600, .750, 1.000, 1.250, 1.500, 2.000, 2.500, 3.000, 4.000, 5.000, 6.000, 8.000, 10.000</p>						
<p>CAGE NUMBER: 01</p> <p>SIZE: 01</p> <p>REV: 01</p>						

PRINT REVISIONS	DATE

CRM-63

REV. A

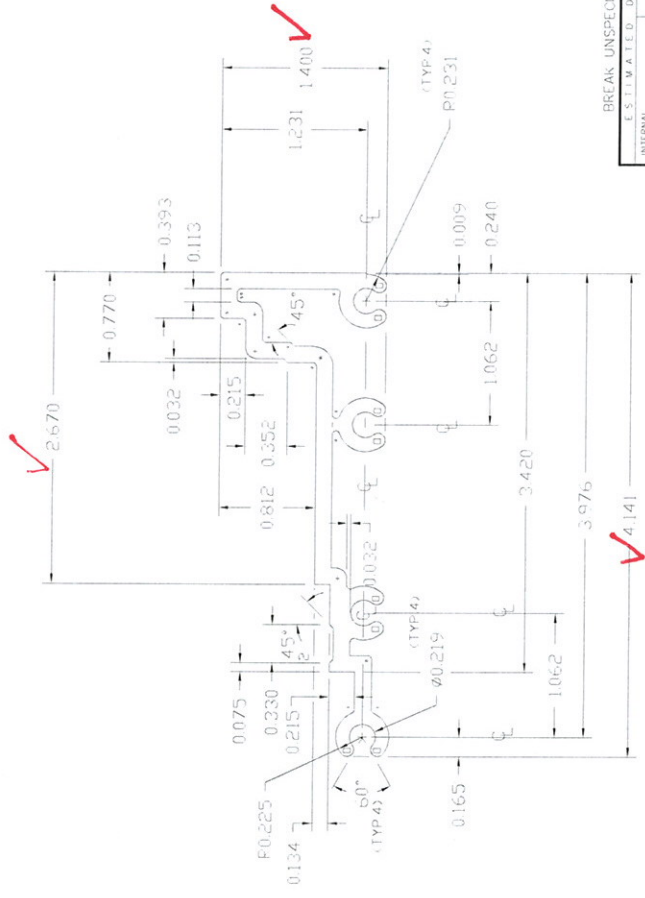
DELHI IFTON BOTH



Test sample complies with these details.
Deviations are noted.

Report # **E1272**

Date **2/25/15** Tech **EAR**



NOTE:
NO EXPOSED SURFACE

- LEGEND
- = 0.031 P (13)
 - = 0.093 P (3)
 - = 0.170 P (1)
 - o = FULL P (6)

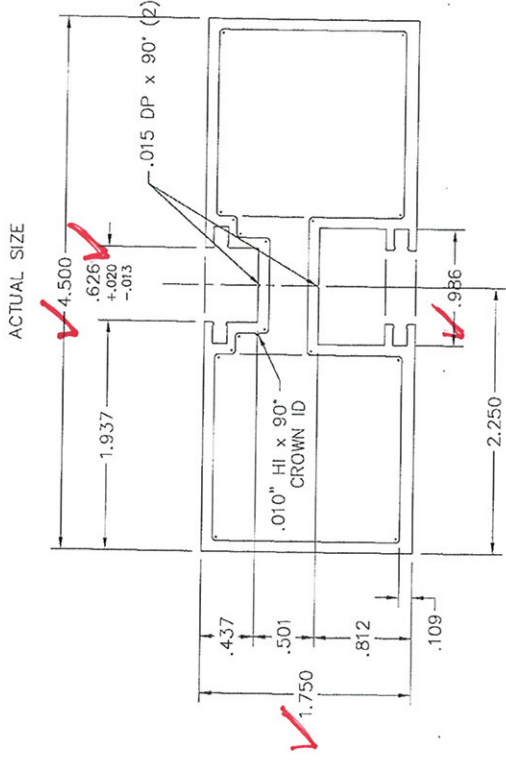
LEGEND

- = 0.31 R
- o = 0.62 R
- x = 1.25 R
- ⊙ = 250 R
- + =

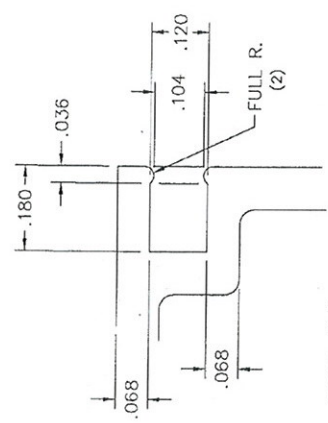
ESTIMATED D.T.E. DATA		BREAK UNSPECIFIED CORNERS 0.010 P 0.140 TYPICAL WALL UNLESS SPECIFIED OTHERWISE	
INTERNAL USE	W/FT	CUSTOMER	SCALE
AREA	1.182	6063-T5	ACTUAL
PERIMETER	17.816	1.418	DATE
SOLID PERIMETER	4 - 5	4 - 5	12-3-88
CIRCULAR PERIMETER	12	12	LAST REVISION
DATE			BROWN M. COPIES
A (ADDED) CREW BOYS	M.B.	P-12-88	JOB
CUSTOMER: sapa: Sapa Extrusions, Inc.			CUSTOMER NUMBER
CITY: DELHI, LA 71232			A-6613
APPLICATION: CRONSTROMS			
LOCATION: MINNEAPOLIS, MINN.			
APPLICATION: SILL CLIP			

PRINT REVISIONS	DATE

12580
Die Number
45-010
Customer Number



ENTIRE OUTSIDE SURFACE EXPOSED



DETAIL "A"
4 x SIZE



Test sample complies with these details.
Deviations are noted.

Report # E1712
Date 2/13/15 Tech EAR

03-24-11 added .625 tolerance
TYPICAL WALL UNLESS OTHERWISE NOTED: .090

BREAK UNSPECIFIED CORNER: .010 R.		ESTIMATED DIE DATA	
ALLOY/TEMPER	6063-15	AREA	1.445
PERMETER	31.168	WT/FT	1.733
OUTSIDE PERMETER	17.197	CORNER SIZE	4 - 5
EXPOSED PERMETER	17.197	FACTOR	18
DATE		DIE REVISIONS	
LEGEND			
•	= .031 R.	○	= .062 R.
×	= .125 R.	⊗	= .250 R.
*	=		

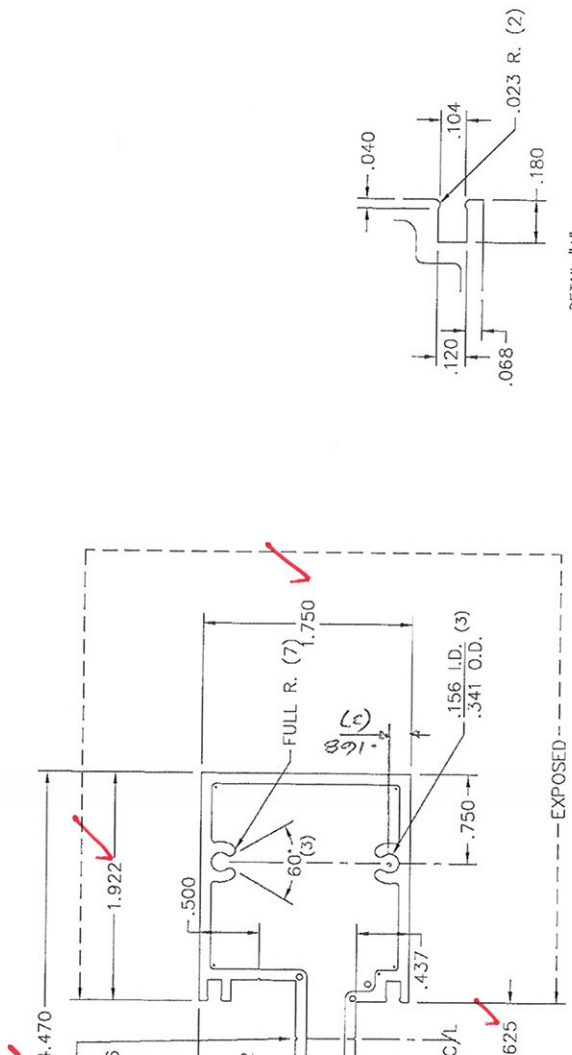
Crown Extrusions, Inc. 122 Columbia Court N. Chaska, MN 55318 952-446-8335 Fax: 952-446-8326		DIE # 12580
CMI Architectural CMI Architectural Products, Inc. 20621 SD Highway 25 DeSmet, SD 57231-5827 605-854-3326 Fax: 605-854-3920		SCALE FULL & NOTED
CUSTOMER MULLION		DATE 12-11-08
PART NAME:		LAST REVISION 03-24-11
DRAWN TCC		CUSTOMER NUMBER 45-010

STANDARD TOLERANCES APPLY UNLESS OTHERWISE NOTED

PRINT REVISIONS	DATE
1 REDRAWN ON CAD MB	7-30-98

CRM-44

REV.	
DELHI	<input type="checkbox"/>
TIFTON	<input type="checkbox"/>
BOTH	<input type="checkbox"/>



DETAIL "A"
2 x SIZE

BREAK UNSPECIFIED CORNERS .010 R. .090 TYPICAL WALL UNLESS SPECIFIED OTHERWISE.

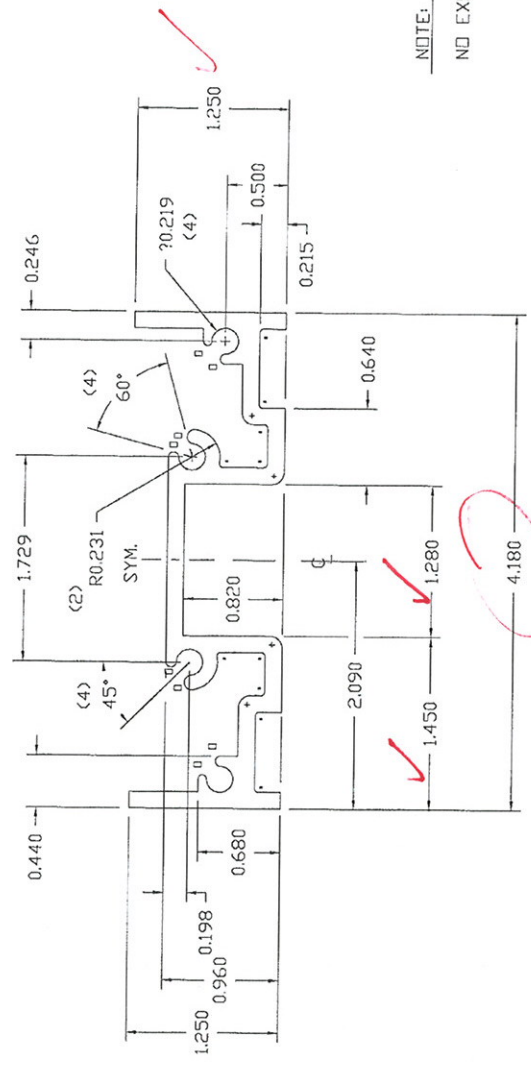
ESTIMATED DIE DATA		sapa:		CARD #	
INTERNAL USE	6063-T5	sapa Extrusions, Inc.		CRM-44	350
AREA	1.354	DETAIL 14-7182		SCALE	FULL & NOTED
PERMETER	29.721	CUSTOMER		DATE	7-29-98
OUTSIDE PERMETER	15.421	CMI ARCHITECTURAL PRODUCTS		LAST REVISION	
EXPOSED PERMETER		2800 FREEWAY BOULEVARD		DRAWN	Michael Bryson
		SUITE 205		JOB	
		MINNEAPOLIS, MN 55430		CUSTOMER NUMBER	45-018
		APPLICATION			
		F.C. SILL 1/4"			

LEGEND	DATE
• = .031 R.	
o = .062 R.	
x = .125 R.	
⊗ = .250 R.	
* =	
* =	

Architectural Testing
 Test sample complies with these details.
 Deviations are noted.
 Report # **E272**
 Date **2/13/15** Tech **SSR**

CRM-62

PRINT REVISIONS	DATE



Test sample complies with these details.
Deviations are noted.

Report # **E1272**

Date **2/13/15** Tech **GRK**

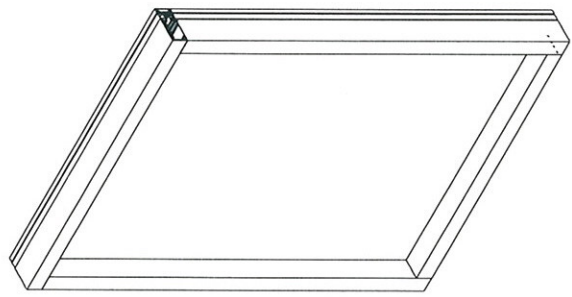
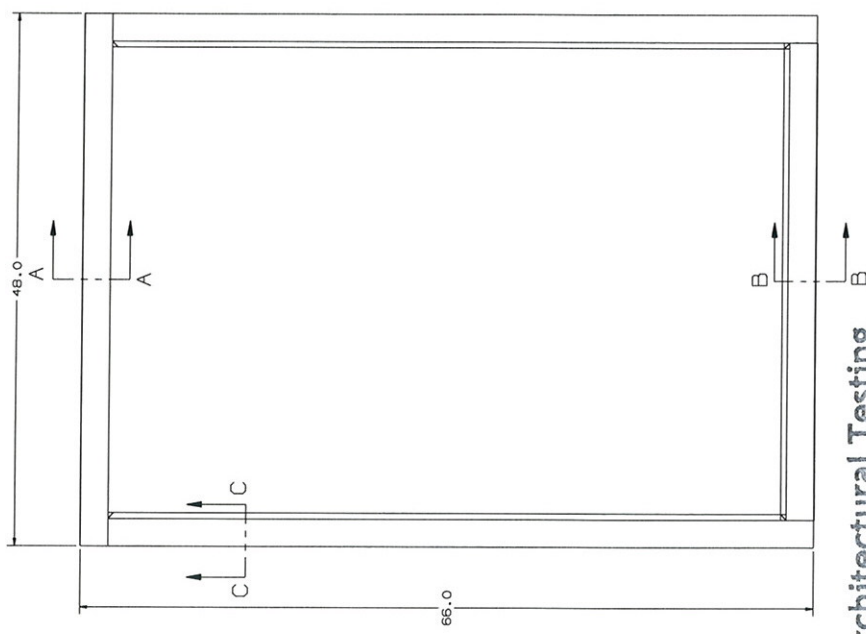
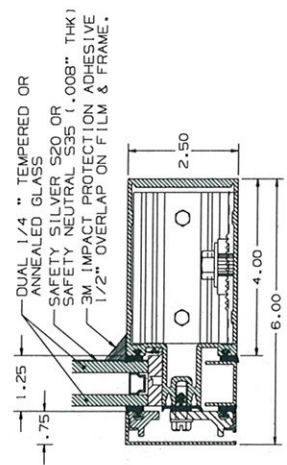
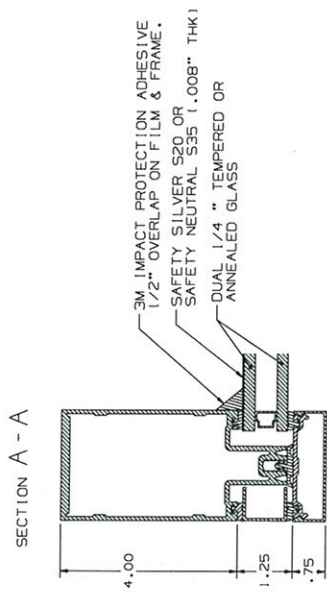
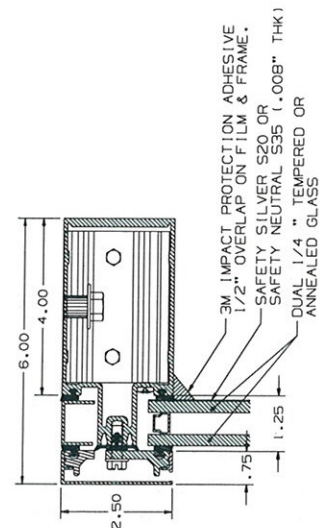
NOTE:

NO EXPOSED SURFACE

LEGEND:

- = 0.031 R. (10)
- + = 0.100 R. (4)
- o = FULL R. (8)

ESTIMATED DIE DATA		BREAK UNSPECIFIED CORNERS		TYPICAL WALL UNLESS SPECIFIED OTHERWISE.	
INTERNAL USE	6063-T5	0.010	R.	0.140	R.
AREA	1.389	W/FT	1.667	sapa: Sapa Extrusions, Inc. DELHI, LA 71232	
PERIMETER	23.555	CIRCLE SIZE	4-5	CUSTOMER: CRONSTROMS	
OUTSIDE PERIMETER		FACTOR	12	MINNEAPOLIS, MINN.	
EXPOSED PERIMETER		DIE REVISIONS		DRAWN: M. COPEL	
				JOB	
				DATE: 12-3-88	
				LAST REVISION	
				SCALE: ACTUAL	
				CAND # MRC---10 010	
				APPLICATION: MULL. CLIP	
				CUSTOMER NUMBER: 32-002	



Architectural Testing

Test sample complies with these details. Deviations are noted.

Report # E172
Date 2/13/15 Tech SK

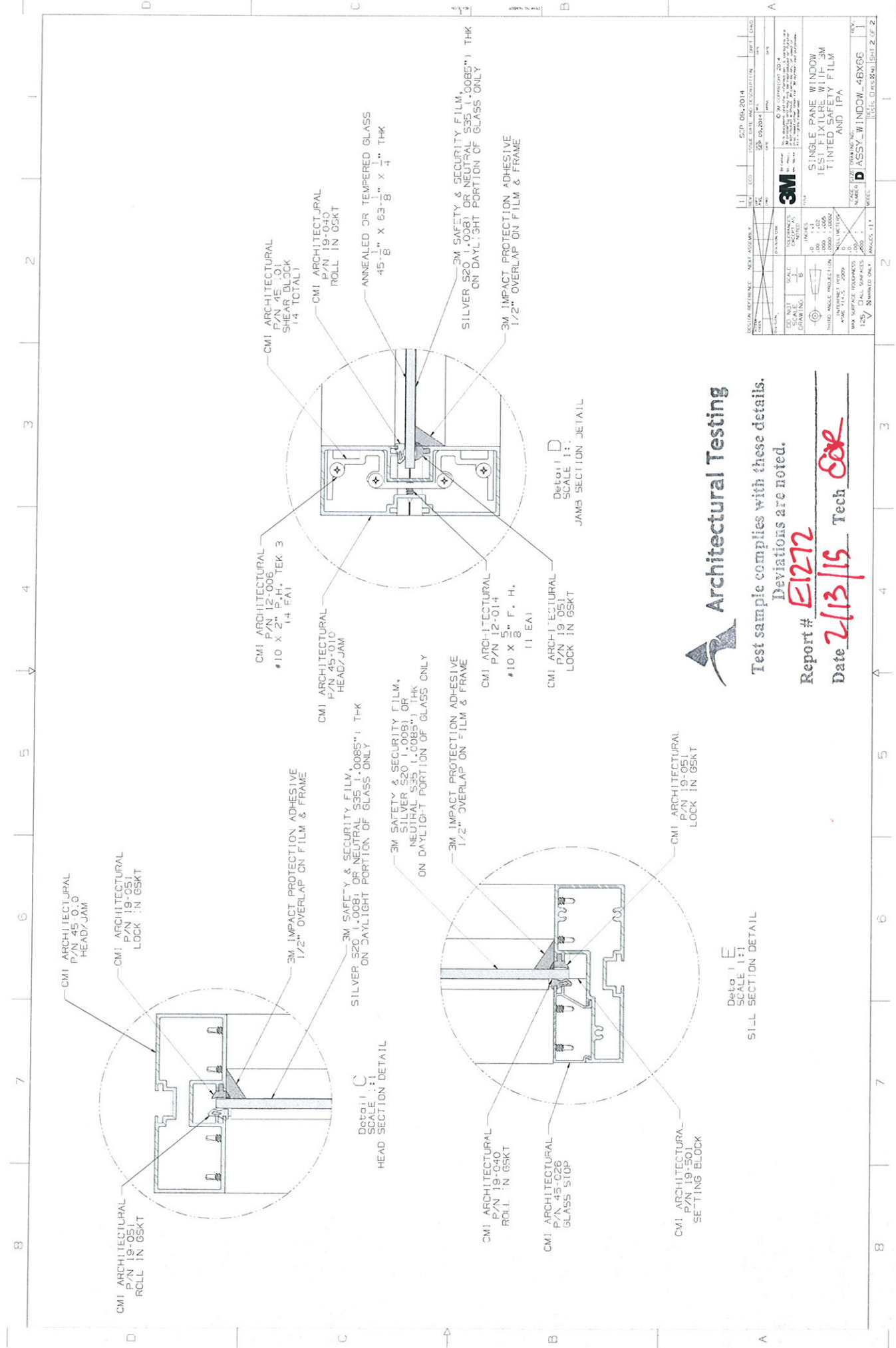
SECTION REFERENCE	KEY ASSIGNED	PRE-RELEASE DATE	LAST
01	E172	JAN 20, 2015	LAS
02	E172	JAN 20, 2015	OFF. 1. 000
03	E172	JAN 20, 2015	OFF. 1. 000
04	E172	JAN 20, 2015	OFF. 1. 000
05	E172	JAN 20, 2015	OFF. 1. 000
06	E172	JAN 20, 2015	OFF. 1. 000
07	E172	JAN 20, 2015	OFF. 1. 000
08	E172	JAN 20, 2015	OFF. 1. 000
09	E172	JAN 20, 2015	OFF. 1. 000
10	E172	JAN 20, 2015	OFF. 1. 000
11	E172	JAN 20, 2015	OFF. 1. 000
12	E172	JAN 20, 2015	OFF. 1. 000
13	E172	JAN 20, 2015	OFF. 1. 000
14	E172	JAN 20, 2015	OFF. 1. 000
15	E172	JAN 20, 2015	OFF. 1. 000
16	E172	JAN 20, 2015	OFF. 1. 000
17	E172	JAN 20, 2015	OFF. 1. 000
18	E172	JAN 20, 2015	OFF. 1. 000
19	E172	JAN 20, 2015	OFF. 1. 000
20	E172	JAN 20, 2015	OFF. 1. 000
21	E172	JAN 20, 2015	OFF. 1. 000
22	E172	JAN 20, 2015	OFF. 1. 000
23	E172	JAN 20, 2015	OFF. 1. 000
24	E172	JAN 20, 2015	OFF. 1. 000
25	E172	JAN 20, 2015	OFF. 1. 000
26	E172	JAN 20, 2015	OFF. 1. 000
27	E172	JAN 20, 2015	OFF. 1. 000
28	E172	JAN 20, 2015	OFF. 1. 000
29	E172	JAN 20, 2015	OFF. 1. 000
30	E172	JAN 20, 2015	OFF. 1. 000
31	E172	JAN 20, 2015	OFF. 1. 000
32	E172	JAN 20, 2015	OFF. 1. 000
33	E172	JAN 20, 2015	OFF. 1. 000
34	E172	JAN 20, 2015	OFF. 1. 000
35	E172	JAN 20, 2015	OFF. 1. 000
36	E172	JAN 20, 2015	OFF. 1. 000
37	E172	JAN 20, 2015	OFF. 1. 000
38	E172	JAN 20, 2015	OFF. 1. 000
39	E172	JAN 20, 2015	OFF. 1. 000
40	E172	JAN 20, 2015	OFF. 1. 000
41	E172	JAN 20, 2015	OFF. 1. 000
42	E172	JAN 20, 2015	OFF. 1. 000
43	E172	JAN 20, 2015	OFF. 1. 000
44	E172	JAN 20, 2015	OFF. 1. 000
45	E172	JAN 20, 2015	OFF. 1. 000
46	E172	JAN 20, 2015	OFF. 1. 000
47	E172	JAN 20, 2015	OFF. 1. 000
48	E172	JAN 20, 2015	OFF. 1. 000
49	E172	JAN 20, 2015	OFF. 1. 000
50	E172	JAN 20, 2015	OFF. 1. 000
51	E172	JAN 20, 2015	OFF. 1. 000
52	E172	JAN 20, 2015	OFF. 1. 000
53	E172	JAN 20, 2015	OFF. 1. 000
54	E172	JAN 20, 2015	OFF. 1. 000
55	E172	JAN 20, 2015	OFF. 1. 000
56	E172	JAN 20, 2015	OFF. 1. 000
57	E172	JAN 20, 2015	OFF. 1. 000
58	E172	JAN 20, 2015	OFF. 1. 000
59	E172	JAN 20, 2015	OFF. 1. 000
60	E172	JAN 20, 2015	OFF. 1. 000
61	E172	JAN 20, 2015	OFF. 1. 000
62	E172	JAN 20, 2015	OFF. 1. 000
63	E172	JAN 20, 2015	OFF. 1. 000
64	E172	JAN 20, 2015	OFF. 1. 000
65	E172	JAN 20, 2015	OFF. 1. 000
66	E172	JAN 20, 2015	OFF. 1. 000
67	E172	JAN 20, 2015	OFF. 1. 000
68	E172	JAN 20, 2015	OFF. 1. 000
69	E172	JAN 20, 2015	OFF. 1. 000
70	E172	JAN 20, 2015	OFF. 1. 000
71	E172	JAN 20, 2015	OFF. 1. 000
72	E172	JAN 20, 2015	OFF. 1. 000
73	E172	JAN 20, 2015	OFF. 1. 000
74	E172	JAN 20, 2015	OFF. 1. 000
75	E172	JAN 20, 2015	OFF. 1. 000
76	E172	JAN 20, 2015	OFF. 1. 000
77	E172	JAN 20, 2015	OFF. 1. 000
78	E172	JAN 20, 2015	OFF. 1. 000
79	E172	JAN 20, 2015	OFF. 1. 000
80	E172	JAN 20, 2015	OFF. 1. 000
81	E172	JAN 20, 2015	OFF. 1. 000
82	E172	JAN 20, 2015	OFF. 1. 000
83	E172	JAN 20, 2015	OFF. 1. 000
84	E172	JAN 20, 2015	OFF. 1. 000
85	E172	JAN 20, 2015	OFF. 1. 000
86	E172	JAN 20, 2015	OFF. 1. 000
87	E172	JAN 20, 2015	OFF. 1. 000
88	E172	JAN 20, 2015	OFF. 1. 000
89	E172	JAN 20, 2015	OFF. 1. 000
90	E172	JAN 20, 2015	OFF. 1. 000
91	E172	JAN 20, 2015	OFF. 1. 000
92	E172	JAN 20, 2015	OFF. 1. 000
93	E172	JAN 20, 2015	OFF. 1. 000
94	E172	JAN 20, 2015	OFF. 1. 000
95	E172	JAN 20, 2015	OFF. 1. 000
96	E172	JAN 20, 2015	OFF. 1. 000
97	E172	JAN 20, 2015	OFF. 1. 000
98	E172	JAN 20, 2015	OFF. 1. 000
99	E172	JAN 20, 2015	OFF. 1. 000
100	E172	JAN 20, 2015	OFF. 1. 000

ASSEMBLY - SAFETY SERIES TINTED IPA - DOUBLE PANE

CODE: 1717 DWTG: 001

NO. 101

NO. 101



REV	DATE	BY	CHKD	APP'D	DESCRIPTION	SCALE	UNIT	QTY
1	05-20-14	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...

DO NOT SCALE FROM THIS DRAWING	SCALE: 1/8" = 1'-0"	UNLESS OTHERWISE NOTED
THIRD ANGLE PROJECTION	1000 LBS LOAD	1/2" MIN. CLEARANCE
MAX SURFACE ROUGHNESS	125	ALL SURFACES

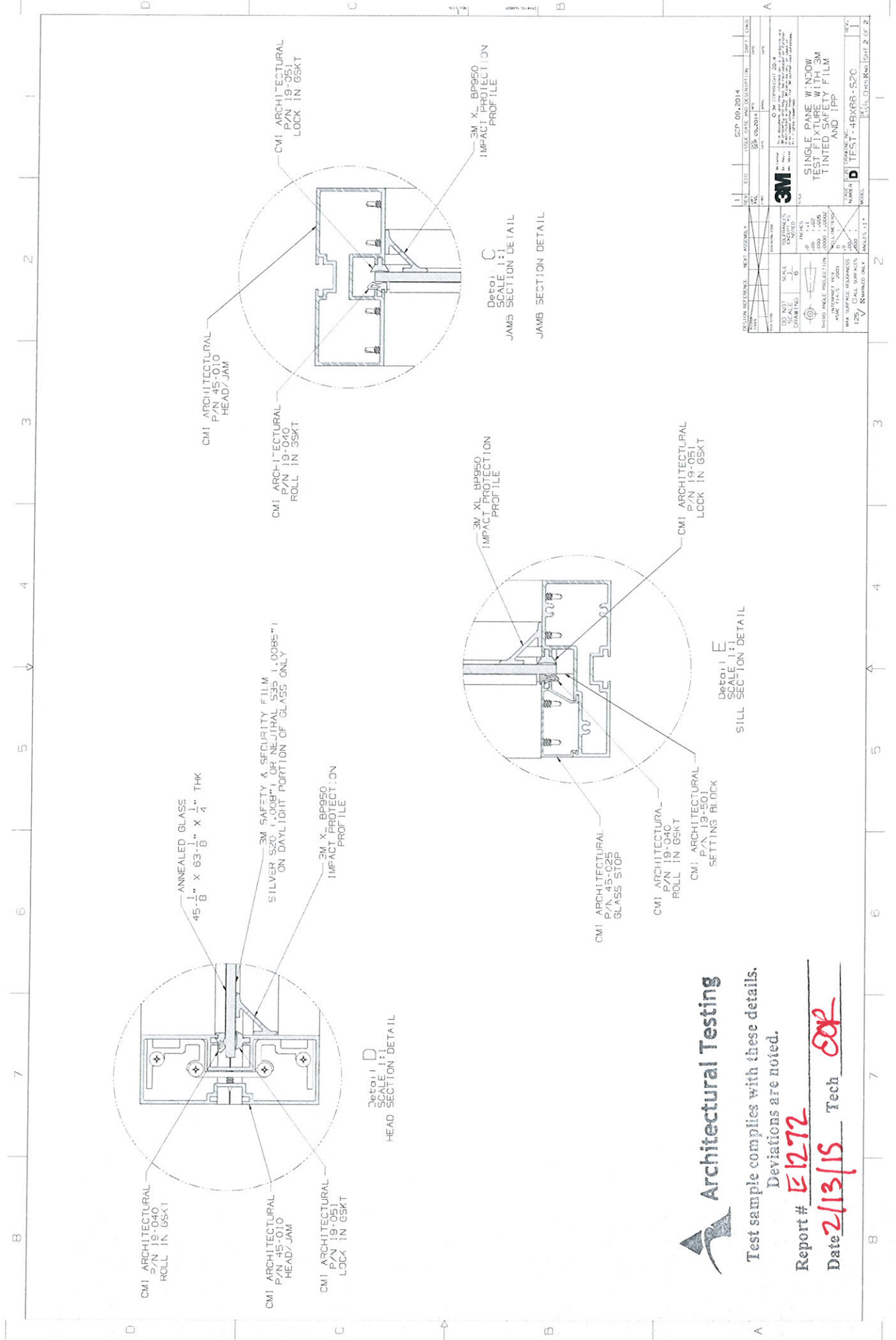
3M	© 3M COPYRIGHT 2014
SINGLE PANE WINDOW TEST FIXTURE WITH 3M TINTED SAFETY FILM AND IPA	
3M	3M SAFETY & SECURITY FILM
3M	3M IMPACT PROTECTION ADHESIVE
3M	3M SHEAR BLOCK
3M	3M TEK
3M	3M ANNEALED OR TEMPERED GLASS

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # **E1272**

Date **2/13/15** Tech **SCR**



Detail D
SCALE 1:1
HEAD SECTION DETAIL

Detail C
SCALE 1:1
JAMB SECTION DETAIL

Detail E
SCALE 1:1
SILL SECTION DETAIL

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # **E1272**

Date **2/13/15** Tech **EAR**

DESIGN REFERENCE		REV	DATE	BY	CHKD	DATE	BY	CHKD	DATE	BY
NEXT ASSIGNED										
3M			05-2014							
DO NOT SCALE DIMENSIONS										
INDICES										
THIRD ANGLE PROJECTION										
MAX SURFACE FINISHES										
125										
DRAWN ONLY										
SHEET 1										
SHEET 2 OF 2										

3M
SINGLE PANE WINDOW
TEST FIXTURE WITH 3M
TINTED SAFETY FILM
AND IPP
TEST-49X86-520